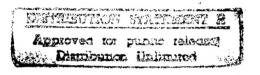
FINAL SUBMITTAL



ENERGY SURVEYS OF

ARMY INDUSTRIAL FACILITIES
ENERGY ENGINEERING ANALYSIS PROGRAM

RADFORD ARMY AMMUNITION PLANT RADFORD, VIRGINIA

VOLUME IV

PROGRAMMING DOCUMENTS

89 CONTRACT NO. DACA65
C-0154

DTIC QUALITY INSPECTED 2

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS NORFOLK, VIRGINIA

PREPARED BY:

ENERGY AND ENVIRONMENTAL SERVICES DEPARTMENT REYNOLDS, SMITH AND HILLS, INC.
P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201

MARCH 1991

19971017 274

DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005

CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO ATTENTION OF:

TR-I Library

17 Sep 1997

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Marie Wakeffeld, Librarian Engineering

TABLE OF CONTENTS

QRIP		
•	GP-X-2 - SR-I-1 - GP-N-3 - GP-X-4 - NC-X-1 -	
OSD PIF		
•	GP-B-4 - GP-N-1 - GP-X-6 -	
<u>ECAM</u>		
•	FN-U-1 -	Cover Water Dry Tanks with Insulating Spheres (one tank only)
•	GP-N-8 -	Replace Incandescents with Color-Corrected HPS Screw- Ins
•	GP-N-2 -	Replace Incandescents with Circline Fluorescents

QRIP

				•
DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, use AR 8-4; the proponent agency is OCA.	AL INVESTMENT PROGRAMS onent agency is OCA.	1. PROJECT NO.	REQUIREMENT DD-M	REQUIREMENT CONTROL SYMBOL DD-M(R) 1661
2 TO: CDR, AMC (AMCRM-MP) 3. THRU:		4. FROM: CDR. AMCCOM	6. DOD COMP NAME ATTILY	6. DOD COMP CODE
5001 Eisenhower Avenue Alexandria, VA 22333-			AMSMC-MGP-P (R) 7. COMMAND CODE ISland, IL 61299-6000 W730KK	8. DATE
& PROJECT TITLE	10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION VEARS/MONTHS	
Reduce Water Flow to Incinerator (ECO GP-X-2)	X	7	+	× = = = = = = = = = = = = = = = = = = =
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13, ECONOMIC LIFE	14. EXPECTED OPER-	t Cost) (Average Annuel Savbrys)	
024	25 yrs.	(years)	or 10	_ (emortization)
16. SUBMITTING UNIT(S) 16. UNIT	16. UNIT ID CODE 17. PROJECT DESCRIPTION	TION		
Administrative Contracting WOL Office Radford Army Ammunition Pt. Radford, VA 24141	A hydroclon propellant to be evapo	A hydroclone (hydraulic cyclone sepi propellant inlet to <u>one</u> incinerator to be evaporated.	cyclone separator) will be installed at the incinerator to reduce the amount of water	talled at the nt of water
			•	
In DETAILED JUSTIFICATION Installing a hydroclone will reduce the the amount of fuel oil consumed.		amount of water to be evaporated by the incinerator	incinerator and th	and therefore, reduce
			•	
19. SAVINGS DISPOSITION				
Savings are used to reduce energy costs.	y costs.			
20. OTHER REMARKS (Continue on page 6, if more space is needed)	necded)			

					9074				•
714			SUMMA (ROUND OF)	SUMMARY OF BOLLAH SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	DOLLAR				
		Attach com	computation sheet iden	pulation sheet identifying the method and source of data for savings	d source of data for sai	יותני	DIFFERENCE/SAVING8	SAVINGS	
			PROPOSED METHOD	ETHOD		-	- 47.00	NA OF	4TH YR
BREAKOUT	PRESENT	18T VR	2D VR	3D VR	4TH YR	181 VR	20 44		
SALANY/LABOR/ OVENTIME									
MATERIAL									
UTILITIES							1		
MAINTENANCE/ REPAIR						1			
TRANSPORTATION									
LEASE COSTS									
SALVAGE/								`	
ENERGY (Identity) #2 fuel 011	171,882	163,466	163,466	163,466	163,466	8,416	8,416	8,416	8,416
CONTRACT COSTS								·	
OTHER (Identity)									
TOTALS	171,882	163,466	163,466	163,466	163,466	8,416	8,416	8,416	8,416
				PRIORITIZATION					
(1) INTERNAL RA (1) INTERNAL R	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 7,029 by average a Based on factor and number of years economic life of the	029 by average is economic life of the		nauel savings 8,416 = 0,84 factor. project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4 =	0.84 fr. H-3, App H, Ch. 5,	factor. 5, AR 6-4 =	295 * IRR	RR.	
(2) SAVINGS TO	SAVINGS TO INVESTMENT RATIO (8/1)		17.06	143,577	and divide by present value of investment	ment value of inv	vestment		
Multiply annual savings [undiscounted] (Based on economic life	0	year, select discoun	9/1. ount factor from Tal	8/1. t factor from Table H-4, App H, Ch. 5, AR 5-4	6, AR 6-4.				
(3) RATE OF INV	NATE OF INVESTMENT PER MANPOWER SPACE (RIMS) NA Divide estimated project cost by number	WER SPACE (RIMS) by ni	MS) NA by number of manpower space savings	space savings			RDM8.		

	AND THE OPERATIONAL	COME OPERATIONAL				
22.						FY FUNDS
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	BUDGET ACTIVITY OR PROGRAM ELEMENT	REQUIRED
•		v	70		,	,
<i>m</i> Hydroclone		7,029	-1	7,029		
(1)						
(6)						
(5)						
9						
(c) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION						
(11) TRAINING						
(13) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OFERATIONAL	ME OPERATIONAL			7,029		
(14) TOTAL AMOUNT OF FUNDING REQUESTED I	JNDING REQUESTED IN THIS PROPOSAL			7,029		
(16) TOTAL AMOUNT OF FUNDING REQUIRED FR	JNDING REQUIRED FROM OTHER SOURCE		·	0		
(16) TOTAL (8um of (14) + (15) above)	15) abour)			7.029		
and the second s	e de la constante de la consta					

Inot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial main tenance.

³ Normally not OPA funded

Used to compute amortication in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

1 August 1982

tz		S	UMMARY OF SAVI	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
		SAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
ITEMS	NO. MPR OR MHR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	A CODE
•	•	·	P	FROM	, TO	g. FROM	. 10	L FROM	10
(1) AUTHORIZATIONS ELIMINATED	0		ì						
(2) REQUIREMENTS ONLY ELIMINATED									
BORROWED MILITARY (3) MANPOWER RELEASED									
OVERHIRES OR TEMPORARIES (4) TERMINATED									
(6) ELIMINATED								-	
MANHOURS BAVED FROM MULTIPLE POSITIONS?									
OTHER DOLLAR SAVINGS (7) (Excluding Mempower), a.g., CONTRACT COSTS & UTILITIES			8,416				- 124 (1) 124 (1)		
(8)							•		
(6)									
(01)						-			
(11) TOTAL BOLLAR SAVINGS			8,416						
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enisted	Reflect specific duties being p	c dutes being per	formed with addition	rerformed with additional manhours available (equivalent manyears)	de (equinelens man	प्रत्याच् -			

DATE (YYMNDD) DATE (YYMMDD) DATE (YYMMDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON (Cits regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE A OTHER COORDINATION (Punctional Coordination of local level, e.g., Pac Eng. Log. Pers. etc.) 25. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Initiator) 28. APPROVAL RECOMMENDED BY (MACOM/Apricy) 30. OTHER REMARKS (Cont'd) 27. APPROVED BY

R	Co	H
		G.

SUBJECT		AEP NO	
		SHEET	OF
DESIGNER	G, FKLLON	DATE	114/90
CHECKER	P. Huthins	DATE	114(90

ECO# GP-X-2 REDUCE WATER FLOW INTO INCINERATION

The Combustion program was adapted to Eliminate boiler Absorbtions of Heat by Zeroing the appropriate parameters. Those are shown on the "INPIT" pages of the ENCLOSED runs.

THE INCINERATOR EVAPORATES 2000 LBS/HR OF WATER. THE
FUEL FLOW DECESSARY TO ACCOMPLISH THAT WHILE MAINTAINING
A 1000 FEXIT WAS TEMPERATURE WAS DETERMINED BY ITERATION.
This relationship was subsequently maintained for THE
KEMAINING COMPUTER PURS.

The graph was Generated by Varying THE WATER FLOW (and therefore Fuel Flow) while maintaining The 1000'F Exit GAS Temperature.

ENER / LOSS OF 2000 LRS /AR HO COMPUTER SHEETS

ENERGY LOSS From JAGE 14 = 4.45 MBTL /4R

ENERGY 4055 ST 1800 -35/HIR HLO

COMPUTER SHEETS

ENERS, LOSS FROM PAGE 4:00 NO BTU/ HIL

PNNUAL ENERGY SAVED FROM EACH INCINERATOR

DATA SHOWS 50% INCINERATOR NOAD FACTOR

(+.45-4.00) mbttex 3763 4/rx. 5 = 197/ MB+u/yr

ENEWS/ SAVINGS FIR BOTH INSTRATORS

1971 MBTU/yr x2 = 3942 MBTU/yr

I	25	9	
			(8)

SUBJECT		AEP NO _	
		SHEET	OF
DESIGNER	Pfiff	DATE	10/29/20
CHECKER		DATE	

For PRIP

current energy use for 1 incinerator

From Table z-1 annual quel oil bill is #343,763 (Other, # z fuel oil)

For one incenerator # 343,763/z = \$ 171,882/yr.

Savings for our incinerator hydroclone is

3942/2 = 1971 MBtu Jueloid

Value of savings =

1971 * #4.27 = #8416/yr.

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TIME	12:31 PM

FUEL ULTIMATE	ANALYSIS	DRY FUEL	DRY &	ADJUSTED
CONSTITUENT	WT.PCT.	RECEIVED	ASH FREE	FUEL
CARBON	12.48	86.40	86.40	86.40
HYDROGEN	1.83	12.70	12.70	12.70
OXYGEN	0.01	0.10	0.10	0.10
NITROGEN	0.01	0.10	0.10	0.10
SULFUR	0.10	0.70	0.70	0.70
CHLORINE	0.00	0.00	0.00	0.00
WATER	85.56	0.00	0.00	0.00
INERTS	0.00	0.00	0.00	0.00
TOTAL	100.00	100.00	100.00	100.00

FUEL RATE (TONS/DAY)	28	
TOTAL AIR ASSIGNED (%)	115	
FUEL HIGHER HEATING VALUE (BTU/LB)	1902	
HEAT LOSS DUE TO UNBURNED CARBON (%)	0.00	
CARBON IN RESIDUE (%)	0.00	
EXIT GAS TEMPERATURE (Deg. F)	1000	
AMBIENT DRY BULB TEMP (Deg.F)	80	
HUMIDITY RATIO (LBS H20/LB DRY AIR)	0.0132	
BAROMETRIC PRESSURE (IN.Hg.)	29.92	
RADIATION LOSS (%)	0.00	
UNACCOUNTABLE LOSS (%)	0.00	
ENTHALPY ADDED IN BOILER (BTU/LB)	0	

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TIME	12:31 PM

HEAT LOSSES	MMBTU/HR	PERCENT
IN DRY FLUE GAS	1.31	29.37
FRON H20 IN AIR	0.02	0.35
FROM H20 IN FUELSENSIBLE	0.50	11.21
FROM H20 IN FUELLATENT	2.63	59.06
TOTAL IN WET FLUE GAS	4.45	100.00
DUE TO UNBURNED CARBON	0.00	0.00
DUE TO HOT ASH	0.00	0.00
DUE TO RADIATION & UNACCOUNTABLE	0.00	0.00
TOTAL	4,45	100.00

BOILER EFFICIENCY (%)	0.00
STEAM GENERATED (LBS/HR)	ERR
UNBURNED CARBON (LBS/HR)	0
LBS OF WET FLUE GAS PER LB FUEL	3.41
SPEC.VOL.OF WET FLUE GAS (CU.FT./LB)	42.47
AIR TO FUEL RATIO (LB AIR/LB FUEL)	2.38
COMB. AIR SPECIFIC VOL. (CU.FT/LB)	13.712
COMBUSTION AIR FLOW (LBS/HR)	5635

FLUE GAS ANALYSIS

	% BY VO	LUME	\$ BY WE	IGHT
	WET	DRY	WET	DRY
002	7.64	13.39	13.41	19.38
S02	0.0232	0.0406	0.0592	0.0856
02	1.65	2.89	2.11	3.04
HCL	0.0000	0.0000	0.0000	0.0000
N2	47.77	83.68	53.61	77.49
H20	42.91		30.81	

FLUE GAS FLOWS

	WET	DRY
MASS (LBS/HR)	7972	5516
VOLUME (ACFM) (SCFM)(70DEG.F.) @ 12% CO2	56 43 2049 1 305	3222 1170 1305
F FACTOR (DSCF/MMBTU @12% CO2)		17605

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

INPUT- I	******		********	{***********	
CLIENT	COE		ı	HIE	14-Jun-70
PLANT	RAAP			TIME	06:54 PM
FUEL ULTIMATE					
CONSTITUENT	WT.PCT.	DRY FUEL RECEIVED	ORY & ASH FREE	ADJUSTED FUEL	
CARBON	12.48	86.40	86.40	86.40	
HYDROGEN	1.83	12.70	12.70	12.70	
OXYGEN	0.01	0.10	0.10	0.10	
NITROGEN	0.01	0.10	0.10	0.10	
SULFUR	0.10	0.70	0.70	0.70	
CHLORINE	0.00	0.00	0.00	0.00	
WATER INERTS	85.56 0. 00		0.00		
TOTAL		100.00	100.00	100.00	
FUEL RATE (TO	NS/DAY)			25	
TOTAL AIR ASS				115	
FUEL HIGHER H				1902	
HEAT LOSS DUE		D CARBON (%)		0.00	
CARBON IN RES		5 \		0.00	
EXIT GAS TEMPERATURE (Deg. F)				1000	
AMBIENT DRY B				0.0133	
HUMIDITY RATIO				0.0132 29.92	
RADIATION LOS		ny.)		0.00	
UNACCOUNTABLE				0.00	
	O IN DOLLED	/ DTU ((D)		0.00	

ENTHALPY ADDED IN BOILER (8TU/LB)

0

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TIME	06:54 PM

HEAT LOSSES	MMBTU/HR	PERCENT
IN DRY FLUE GAS	1.18	29.37
FROM H20 IN AIR	0.01	0.35
FROM H20 IN FUELSENSIBLE	0.45	11.21
FROM H20 IN FUELLATENT	2.36	59 .0 7
TOTAL IN WET FLUE GAS	4.00	100.00
DUE TO UNBURNED CARBON	0.00	0.00
DUE TO HOT ASH	0.00	0.00
DUE TO RADIATION & UNACCOUNTABLE	0.00	0.00
TOTAL	4.00	100.00

BOILER EFFICIENCY (%)	0.00
STEAM GENERATED (LBS/HR)	ERR
UNBURNED CARBON (LBS/HR)	0
LBS OF WET FLUE GAS PER LB FUEL	3.41
SPEC.VOL.OF WET FLUE GAS (CU.FT./LB)	42.47
AIR TO FUEL RATIO (LB AIR/LB FUEL)	2.38
COMB. AIR SPECIFIC VOL. (CU.FT/LB)	13.712
COMBUSTION AIR FLOW (LBS/HR)	5071

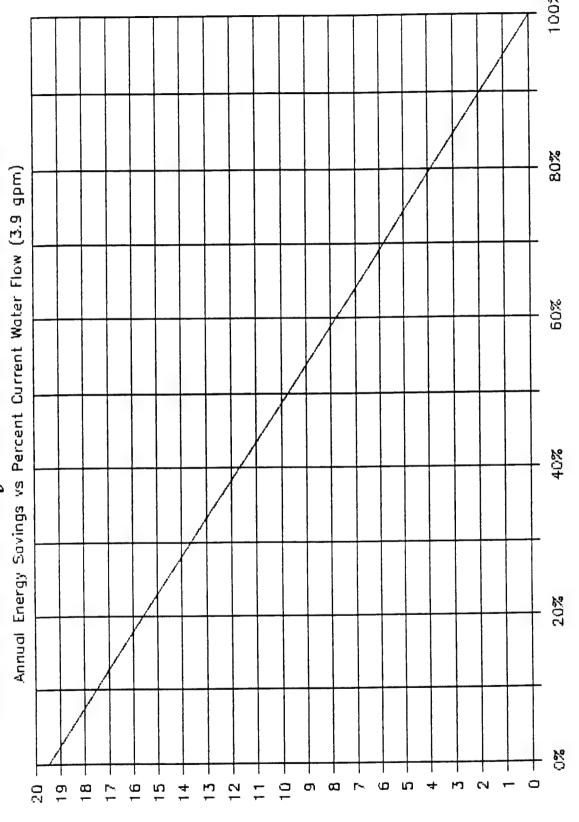
FLUE GAS ANALISIS

	% BY VOLUME		₹ BY WE	IGHT
	WET	DRY	WET	DRY
	WC1		WC1	
002	7.64	13.39	13.41	19.38
S02	0.0232	0.0406	0.0592	0.0856
02	1.65	2.89	2.11	3.04
HCL	0.0000	0.0000	0.0000	0.0000
N2	47.77	83.68	53.61	77.49
H20	42.91		30.81	

FLUE GAS FLOWS

	WET	ORY
MASS (LBS/HR)	7175	4964
VOLUME (ACFM)	5079	2 899
(SCFM)(70DEG.F.)	1844	1053
@ 12% CO2	1174	1174
F FACTOR		
(DSCF/MMBTU @12% CO2)		17605

Radford Army Ammunition Plant



Annual Energy Savings (Mbtu)
(Thousands)

Current Water Flow (%)

HunTer

Telephone Call Confirmation

						79-000
ocal	L.DX	Placed	F	Rec'd	Da	te 5-22-9
		Co	nversed With_			(404) 394-62
of Poss	DORR OL	-IVER	_ Regarding	Hypro	CLONES	
1" HY	DROCLONE	is corr	ect s/2	PRO	VIOED	PARTICLES
CAN PI	ASS 4 mm	ORIFIC	E wir	c get	50/	PARTICLES TO SPLIT
Oon n	TO 30 p	4 at	50 PS/6	DP.	COST	is \$100.
	. M					

CONSTRUCTION COST	ESTIMA	TE		DATE PREPAREI		SHEET	l of
PROJECT				3-23-6	BASIS FOR ESTIMATE		
ENERGY ENGINEERING	ANALYS	IS			┦ ,⊏	CODE A (No desig	(n completed)
RADFORD ARMY AMMUN	ITION	PLANT			1 —	DE 6 (Preliminary	
REYNOLDS, SMITH AND	HILLS	A.E.	P II	чс.	☐ o т	HER (Specify)	
DRAWING NO.		ESTIM	ATOR		1	CHECKED BY	
	QUANT		r. FA	LABOR		MATERIAL	\
ADD HYDROCLONE SUMMARY	. ON	UNIT	PER	TOTAL	PER	TOTAL	TOTAL COST
TO INCIN. SCURRY LINE		MEAS.			#100		
I'N HYDROCLONE	1	EA	3.99	30		100	/30
1"316SS DIPE	300	ft	3.99	1197	7,42	2226	3423
FIBERGLASS INSULATION							
SERVICE JACKET	300	ST	1.56	11.1.0	1.37		070
I" WALL, I"pipe	300	- (1,36	468	1.3/	411	879
SUB TOTAL			<u> </u>	1695		2737	4402
				1073			1402
LUCATION			.483	1158	1.002	2742	3900
	\			1100	(133)		3 700
SALES TAX 45	10)			0		123	123
SUB TOTAL				1158		2865	4023
FICA/INSURANCE!	203/3)						805
SUB TOT							4828
OH (15%)							724
50B 104							5552
PROF (10%)						•	555
SUB TOT							6107
BONO (1%)							61
. 70T BUZ	`						6168
CONTINGENCY 7,5%)						463
SUR YOU	\						10631
Hercules Supportain							399
-TAL						i –	7029
				Two h	yours!	lever	1/2
					7		#14.058
					MIN		1114,058
				-			

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent spency is OCA.	Y CAPITAL INVESTM the proponent egency is C	MENT PROGRAMS	1. PROJECT NO.		rrquirement co dd-m(1	REQUIREMENT CONTROL SYMBOL DD-M(R) 1561
CDR, AMC (AMCRM-MP)	3. THRU:		4. FROM: CDR, AMCCOM Attn: AMSMC-	MGP-P (R)	6. DOD COMP NAME Army 7. COMMAND CODE	6. DOD COMP CODE A B. DATE
Alexandria, VA 22333-0001			Island,	Rock Island, IL 61299-6000	W73QKK	
& PROJECT TITLE		10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION VEARS/MONTHS	ARS/MONTHS	
Remove Steam Coils from Activated Carbon Area (ECO SR-I-1)	ivated		OSD PIF PECIP	17,057	+ 13,979	X 12
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	occur	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cout)	(Average Annual Savbrgs)	
024				No (Near)	14.6	_ (amortization)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	TION			
Administrative Contracting	WOLLAA	Remove discor recovery area	Remove disconnected preheat steam coils in the activated carbon solven recovery area and adjust fan drive to provide design air flow with	steam coils in drive to prov	the activated ide design air	carbon solver flow with
Uffice Radford Army Ammunition Pt. Radford, VA 24141		reduced syste	reduced system air pressure.			
WOLFACILITY OF LAND						
Steam heating coils previously used to preheat outside air entering the charcoal tanks in the activated carbon solvent recovery process. These coils are no longer used and the steam supply has been disconne Removing these coils will reduce the total pressure to be overcome by supply air fans.	usly used to process. These deduce the total	reheat outside coils are no lα al pressure to	air entering th onger used and t be overcome by	e charcoal tan he steam suppl supply air fan	ıks in the acti y has been dis ıs.	the activated been disconnected.
19. SAVINGS DISPOSITION						
Savings are used to reduce energy costs.	energy costs.					
		•				

20. OTHER REMARKS (Continue on page 5, 1/ more space is needed)

				SUMMA	SUMMARY OF DOLLAR SAVINGS	VINGS				•
4				(ROUND OF	F TO THE NEAREST	DOLLAN)	rings			
			Attach com	Omputation sheet identifying the PROPOSED METHOD	ETHOD	PROPOSED METHOD		DIFFERENCE/SAVINGS	SAVINGS	
- 1	BACINGS	PRESENT	18T VR	20 VR	3D VR	ATH YA	18T VR	20 YR	30 YR	ATH VE
VEN	LALARY/LABOR/ OVENTIME									
MATERIA	MATERIAL/ SUPPLIES									
15	UTILITIES									
MAINTE	MAINTENANCE/ REPAIR									
A S	TRAMBPORTATION									
E A	LEASE COSTS								`	
BALVAGI TURN-IN	BALVAGE/ TURN-IN								1	1
EN EN	Electricity	62,123	48,144	48,144	48,144	48,144	13,979	13,979	13,979	13,9/9
8	CONTRACT COSTS									
P P	OTHER (Identify)									
	TOTALS	62,123	48,144	48,144	48,144	48,144	13,979	13,979	13,979	13,979
					PRIORITIZATION					
· S	INTERNAL RATINGE SETTINGE BEST OF SECTION OF	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 17,057 by average a Based on factor and number of years economic life of the	057 by average economic life of		13,979 =.	nnual savings 13,979 = 1.22 factor. project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4		138 · * IRR	뼔	
	- 1									
(2)		Multiply annual sevings 13,979	X discount factor	8.78 8/1.	122,736		_and divide by present value of investment	vestment		
	(Based on economic life.	nomic life 15	years, select discount		factor from Table H-4, App H, Ch. 5, AR 5-4.	. 6, AR 6-4.				
3		RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	EN SPACE (RIMS)	NA						
	Divide estimal	Divide estimated project cost	nu kq	by number of manpower space savings	r space savings	•		KIMB.		
	(Manpower re	(Manpower requivalents cannol of used in this competition)								

	COST FOR PROJECT TO BECOME OPERATIONAL	OME OPERATIONAL				
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT		QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS REQUIRED
•		ú	•	•	,	,
m						
(2)						
(9)	•					
(9)						
(9)						
(6) TRANSPORTATION (Equipment delbery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION			1. 91 1.91			
(9) MAINTENANCE CONTRACT ²			• 134 13 1			
(10) FACILITIES MODIFICATION ³						
(11) TRAINING						
(12) OTHER (Specify): Remove coils a	and adjust fan drives			17,057		
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	ME OPERATIONAL			17,057		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	JNDING REQUESTED IN THIS PROPOSAL			17,057		
(16) TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			0		
(16) TOTAL (8um of (14) + (15) abour)	(6) abour)			17,057		
IN a second 10% of outbown tout for ORIP projects	profects					

INot to exceed 10% of equipment cost for QRIP projects.

²Applicable to OPA QRIP provided cost is included in packaged dost involving one bill for the equipment and initial maintenance.

³ Normally not OPA funded.

⁴Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

Tr.		18	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
		BAVINGS				REAFFLICATION OF SAVINGS	SAVINGS		
ITEM	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	N CODE
	•	v		e. FROM	ر TO	g. FROM	h. TO	L FROM	10
REQUIREMENTS AND (1) AUTHORIZATIONS ELIMINATED									
(3) REQUIREMENTS ONLY ELIMINATED									
BORROWED MILITARY MANPOWER RELEASED									
OVERHIRES ON TEMPORARIES (4) TERMINATED							٠.		
HOURS OVERTIME ELIMINATED								-	
MANHOURS SAVED FROM MULTIPLE POSITIONS?									
OTHER DOLLAR SAVINGS (7) (Excluding Mempower), e.g., CONTRACT COSTS & UTILITIES			13,979				er any		
(0)							•		
(6)									
(01)									
(11) TOTAL BOLLAR SAVINGS			13,979			•			
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specific duries being	c duries being per	performed with additional manhours evailable (equivalent manyears)	wel manhours evel	sbe (equivalens mu	nycard a			

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REGULATORY APPROVAL/COO	VAL/COORDINATION
INVESTMENT STATEMENT	STATEMENT
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	facilities. This investment is in accordance with established investment planning.
	•
(Cite regulatory approved, e.g., TAGO Control No.) (Ex. New Start, TAGO Approved, etc.)	i Na.) (Et. New Start, TAGO Approved, etc.)
, OTHER COORDINATION (Punctional Coordination of local level, e.g., Pec Eng, Log, Pers. etc.)	
26. SUBMITTED BY (Typod name, grade and litte of Subordinate Command/Agency or Profect	SIGNATURE DATE (YYMMDD)
inliketory	AUTOVON
2. APPROVAL RECOMMENDED BY (MACOM/Apricy)	SIGNATURE DATE (YYMMDD)
	AUTOVON
FOR USE BY HQDA ON	FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
27. APPROVED BY	
	NOVOTOX .
20. OTHER REMARKS (Conf'd)	

REYNOLDS. SMITH AND HILLS
REMOVE Steam Coils
RECHITECTS · ENGINEERS · PLANNERS
INCORPORATED

CHECKER

RAAF EEAF

AEP NO 2900379000

SHEET OF

DATE 5/21/90

CHECKER

DATE 6/12/90

ECO# SR-I-1

by 20%.

REMOVE STEAM COIL FROM A.C.S.R. DUCTWORK Assumptions:

- 1. The 450 hp exhaust fan motors are oversized
 - 2. The total pressure on the Fan is 20 inches of water.
 - 3. The efficiency of the fan and drive assembly is 65 %.
 - 4. The efficiency of the fan motor is 85%.
 - For inch. The pressure drop across each coil is 0.75 inches of water.
 - 6. The exhaust Eystem operates 24 hours per day, 260 days per year (6240 hrs/yr).

Current Energy Consumption:

Php = Motor hp = 1.2 = 450 hp = 1.2 = 375 Bhp

Annual energy use = 329 km × 6240 hrs = 2,052,960 kwh/yr

Annual energy use = 2,052.96 Mwh × 3,413 MBtu = 7007 MBtu/yr

Annual energy cost = 2,052,960 kwh × 0.03026 Kwh = \$62,123/yr

REYNOLDS.			
18	CORPORATI	ED	

UBJECT			
Rem	ove.	Steam Coils	
ESIGNER	W	.T. Todd	

AEP NO		*******	
SHEET	_2	of	
DATE			*************
DATE			

Additional Energy Consumption:

There is no additional energy consumption required by this ECO.

Energy Savings:

Exhaust CFM = Bhp x Fau. Eff. x 6350 Total Pressure

CFM = 375 hp x 0.65 x 6350 = 77,390 cu.ft.

The reduction in total pressure by removing the steam coils would be:

TPr = 0.75 in. H20 /coil x 3 coils = 2.25 in. H20

The reduction in Fan horsepower required is:

$$HP_r = \frac{CFM * TP_r}{Fan. EFF. \times 6350} = \frac{77390 \times 2.25}{0.65 \times 6350} = 42 hp$$

Energy Savings = 2 bldgs × 37 km × 6240 hr/yr = 461,760 Kwh/yr

Energy Savings = 461.76 Mwh 3:413 MBtu = 1576 MBtu/yr

Annual cost savings = 461,760 Kwh × 0.03026 1/kwh = 413,973/yr

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS · PL	ANNERS
n	NCORPORAT	ED	

SUBJECT	AEP NO
Remove Steam Coils	
DESIGNER W.T. Todd	DATE
	DATE

ECO Cos		and the control of th		Venlerina	
	adjusting			replacing	
R Fa	efer to Co or detaile	pustruction it eniz	ation of	stimate s	iheet
Simple 1	Payback =				
Ecc	Payback	= Cost	= Saving	. .	
			7 ÷ #13,97		

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CONSTRUCTION COST	CTILLAT	E		DATE PREPARED	10-	SHEET	+ 05
CONTINUE COST	COLIMAI	_		5/21	90 BASIS FOR		1 5
ENERGY ENGINEERING	ANALYS!	S				ODE A (No deergo	completed)
RADFORD ARMY AMMUN	ITION P	LANT			coo	E B (Preliminary d	eeign)
REYNOLDS, SMITH AND	HILLS	A.E.	P., IN	IC.	_	ER (Specify)	
DRAWING NO.		ESTIM	ATOR	T. Todd	c	HECKED BY	F
0 (1	QUANTI	TY		LABOR	МА	TERIAL	
Remove Steam Coilsummary	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER	TOTAL	COST
Duit Demolition, 72"	30	LF	2.70	81.00	_		81.00
Coil Removal, 500 1b ea	1.5	Ton	395	592.50			592.50
Duct, 72" Stainless Steel	30	LF	31	930.00	63	1890.00	2820.00
Duct insulational =" 1216	565	SF	1.07	604.55	0.52	293.80	898.35
Duct ins. Jacket, Gal. Steel	30	LF	22.95	688.50	28.52	855.60	1544.10
Adjust fan, balance air	-	EA	15.0	150.00	25	25.00	175.00
Subtotal				3046.05		3064.40	6110.45
Location Adjustments			0.683	(965.60)	1.002	6.13	(959.47)
Sales Tax					4.5%	137-62	137.62
FICA/Insurance			20%	416.09			416.09
Subtotal							5704.69
Overhead	15%						855.70
Profit	10%						656.04
Performance Rond	170						72.16
Contingency	10%						728.86
RAAP Support	6%						481.05
00							
Construction Cost	Ifor .	each	buil	ding)		·	8498.50

Construction Cost	(For	tu	o bu	ildings)			\$16997.00
Source:							
Means Mechanical Co	x+ N	+	190	9 Baro	Casta		
		10 66		1 10114	へいろ アゼ		

Telephone Call Confirmation

	Project No. 2900379 000
Bill Toda Converse	ed With Everett Grubb /H. Hill
Of RAAP Maintenance Rega	arding Activated Carbon Sol. Recovery
Mr. Grubb was not available assistant about heat recove	
* Solvent condenser uses fi at 40 lbs pressure.	Itered water (not chilled water)
	used. The steam values seen shut off,
Distribution:	

3000001		DATE
Cost Estu	MATE BACKUP	
oil removal	500 lb each	\$395/ton
act removal	72" wide	\$2.70 /LF
ew Duct - 5. Ste	el 72" round	
t insulation		
sulation jack	et 74" Ø	
	DESIGNER WITT CHECKER CHECKER	Cost Estimate BACKUp oil removal 500 16 each act removal 72" wide ew Dact - 5. Steel 72" round \[\frac{35 - 31.5}{4} \times 32 + 35 = \frac{4}{63.00} / \text{LI} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \] \[\frac{15.4 - 13.45}{4} \times 32 + 15.40 = \frac{4}{31.00} / \text{L} \]

256

Fan adjustment (air balance)

\$175 each

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS · PL	ANNERS
11	CORPORAT	ED	

SUBJECT	AEP NO
	SHEETOF
DESIGNER B. Todd.	DATE
CHECKED	DATE

COST ESTIMATE BACKUP

Means Mech. page

12

Coil removal 500 16 each \$395/ton

12

Duct removal 72" wide \$2.70/LF

231

New Duct - 5. Steel 72" round

Nat = (35-31.5) x 32 + 35 = \$63.00 /LF

Lab= (15.4-13.45) x 32+15.40 = \$31.00/LF

171

Duct insulation

2741 = 2×3,14 × 3Ft × 30Ft = 565 sq. Ft.

129

insulation jacket 74" Ø

gal, steel

mat = (13.95-11.65) × 38 + 13.95 = \$28.52/LF

Lab = (13.45-11.95) ×38 × 13.45 = \$22.95/LF

256

Fan adjustment (air balance)

\$175 each

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proposent esency is OCA.	Y CAPITAL INVESTM		1. PROJECT NO.		REQUIREMENT C DD-MI	REQUIREMENT CONTROL SYMBOL DD-M(R) 1561
2 TO: AMC (AMCRM-MP) 5001 Eisenhower Avenue Alexandria, VA 22333-0001	э. тняи:		* FROM: AMCCOM CDR: AMSMC- Rock: Island,	ACCOM: AMSMC-MGP-P (R) 1. COMMAND CODE ISland, IL 61299-6000 W73QKK	6. DOD COMP NAME ALMY 7. COMMAND CODE W73QKK	6. DOD COMP CODE A 8. DATE
Replace Exterior Incandescents with Fluorescents (ECO GP-N-3)	nts with	10. TYPE OF PRCJECT (Check one)		11. AMONTIZATION VEANS/MONTHS	ANS/MONTHS + 15,770	×
12. Functional area where savings will occur 0.24	occur	13. ECONOMIC LIFE	14. EXPECTED OPER. ATIONAL DATE	(Project Cout) 1.4 (years)	(Average /	1 =
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	Replace exterior incan fluorescent screw-ins.	Replace exterior incandescent floodlights with 13 watt compact fluorescent screw-ins.	int floodlights	with 13 watt	compact
is DetaileD Justification Existing incandescent flood lights have an efficacy lumens/watt. This is recommended in areas where a and the fixtures are non-explosion proof type.	l lights have d mmended in ared plosion proof	e an efficacy of about 15 lumens/watt. reas where a 25-percent reduction in l of type.	of about 15 lumens/watt. Fluorescents of 25-percent reduction in lighting level is	5.	Fluorescents offer about 50 Ihting level is acceptable	fer about 50 acceptable
19. SAVINGS DISPOSITION						
Savings are used to reduce	reduce energy costs.	•				
20. OTHER REMARKS (Continue on page 5, if more space is needed)	re space is needed)					

VIIV	Vaftast 1987				48 84 1100 30 20	NINGS				٠
4				(ROUND OF	(ROUND OFF TO THE NEAREST DOLLAR)	DOLLAR				
			Attac	Attach computation sheet identifying t	putation sheet identifying the method and source of data for savings	nd source of data for s	שאועלנו מאושלנו	DIFFERENCE/SAVINGS	/SAVINGS	
3	SAVINGS	PRESENT	AV TA	20 VA	3D VR	4TH YR	18T VR	20 VR	3D VA	ATH YR
SALARY/L	BALARY/LABOR/									
MATERIAL	IAU	6,302	1,765	1,765	1,765	1,765	4,537	4,537	4,537	4,537
TILTIES	3									
MAINTE	MAINTENANCE/ REPAIR	2,448	297	297	297	297	6,688	6,688	6,683	6,688
TRANS	TRAMBPORTATION									
LEASE	LEASE COSTS								,	
BALVAGE/	IGE/									
ENERG	Electricity	10,168	1,085	1,085	1,085	1,085	9,083	9,083	9,083	9,083
8	CONTRACT COSTS									
OTHE	OTHER (Identity)									
	TOTALS	18,918	3,147	3,147	3,147	3,147	15,770	15,770	15,770	15,770
					PRIORITIZATION					
3	INTERNAL RA Divide estimat	INTERNAL RATE OF RETURN (IRR) Divide setimated project cost 21	1,485 by average		nnual savings 15,770 = 1.36 factor.	1.36 H-8, App H, Ch. 6	factor. 5, AR 5-4 =	1.17 % IRR.	RB.	
	Based on fact	Based on factor and number of years economic me of me								
12	SAVINGS TO II	T RATIC	777 X diagrams factor	8.78	138,461	1 1	and divide by present value of investment	vestment		
	Multiply annual sevenga- (undiscounted) 21,4 (Based on economic life,	185		years, select discount factor from Table H-4, App H, Ch. 5, AR 5-4.	able H-4, App H, Ch	. 6, AR 6-4.				
3	RATE OF INV	RATE OF INVESTMENT PER MANPOWER SPACE (RLMS)	DWER SPACE (RIMS)	NA						
	Divide estima	Divide estimated project cost by number	by by this compu	by number of manpower space savings.	er space savings	•		RDAB.		

		COST SOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				•
22		To the second se				APPROPRIATION,	FY FUNDS
EQUIPMENT TYPE	IT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	GUANTITY	TOTAL COST	1,	REQUIRED
u 13 Watt PL Compact Fluorescents	nmpact		. 59.85	359	21,485		
(2)							
(5)							
(4)							
(9)							
(6) TRANSPORTATION (Equipment delbery)	quipment delbery)						
(7) EQUIPMENT MODIFICATION	ATION			. 2 			
(8) EQUIPMENT INSTALLATION	ATION						
(9) MAINTENANCE CONTRACT	RACT ⁸			10+ 112 ⁷ 12			
(10) FACILITIES MODIFICATION	:ATION ³						
(11) TRAINING							
(12) OTHER (Specify):							
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	ON PROJECT TO BECOM	AE OPERATIONAL			21,485		
(91)	TOTAL AMOUNT OF FUNDING REQUESTED I	NDING REQUESTED IN THIS PROPOSAL			21,485		
(31)	TOTAL AMOUNT OF FU	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			0		
(91)	TOTAL (8um of (14) + (15) shows)	S) above)			21,485		
In the second second	Produced Co. Of the constitution	in terts					

INot to exceed 10% of equipment cost for QRIP projects.

² applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial main renence.

³ Normally not OPA funded.

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

1 August 1982

2	ī		ĕ	UMMARY OF SAV	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
							BEAPPLICATION OF SAVINGS	SAVINGS		
	TEN		EVINGS							
		NO. MENS	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	CODE
	•	•	٠	9	e. FROM	f. TO	g. FROM	, TO	L FROM L	TO
8	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
3	REQUIREMENTS ONLY ELIMINATED									
6	BORROWED MILITARY MANPOWER RELEASED									
0 F	OVERHIRES OR TEMPORARIES TERMINATED									
(9)	HOURS OVERTIME ELIMINATED									
5	MANHOURS SAVED FROM MULTIPLE POSITIONS?			2,140						
9 8 9	OTHER DOLLAR BAVINGS (Excluding Mempower), e.g., CONTRACT COSTS & UTILITIES			13,630						
(0)								•		
ê										
(01)										
(11) T	(11) TOTAL BOLLAR SAVINGS			15,770						
386886	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO	Reflect specific	c dutes being per	sformed with addition	⁷ Reflect specific duths being performed with additional manhours evailable (equivalent manyears)	sbe (equivalent mu	(hours)			

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REGULATORY APPROVAL/COORDINATION	
NOTE STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	s accordance with established investment planning.
(Cite maristory approvels, e.g., TAGO Control No.) (Ex. New Start, TAGO Approvel, etc.)	rossl, efc.)
26. SUBMITTED BY (Typed name, grade and 880 of Subordinate Command/Agency or Project Signature	DATE (YYMNDD) AUTOVON
28. APPROVAL RECOMMENDED BY (MACOM/Agency)	DATE (YYMMDD) AUTOVON
27. APPROVED BY SIGNATURE	DATE (YYMMDD)
	AUTOVOM
20. OTHER REMARKS (Confd)	

SUBJECT RAAP Lighting Projects AEP NO 290 0379 6	00
SHEET OF	}
EYNOLDS, SMITH AND HILLS RCHITECTS + ENGINEERS + PLANNERS DESIGNER T. Todd DATE	
INCORPORATED CHECKER DATE	************
CON 2 MICHAEL THERESE WILLIAM THE CHIEFE WITH CAMPAC	/
GP-N-3 REPLACE EXTERIOR INCANDESCENTS WITH COMPACE	
PLUORESCENT FLOODS	- !
1. 1. 1: et PLAD . Ist worth in el hoient incombascon	オ
Many buildings et RAAP are list with inefficient incandescen	
Listing this TO and Duzes the replacement of exterior income	
lighting. This ECO onalyzes the replacement of exterior incand	1
floods with 13WPL compact fluorescent flood retrofits which	
	and the same of
Acrew into the incondescent pockets. This type of project is	
suitable for non-explosion proof fixtures in areas where	
a 20-30% reduction in light level is acceptable. Costs and	
Duly areas operating 3 Shifts I day 5 days who were considered. I A tist of buildings with incardescent lighting was compiled from	2.
Only Careas operating 3 shifts day 5 days who were considered.	
A tot of buildings with incardescent lighting was compiled fro	~
the building survey data (page 3). It is assumed that 50%.	
	,_0.
of the exterior fixtures on this list are non-explasion proof of	DOW
Number of fixtures = 0.5 (717) = 359	
Energy savings = 836 kmh , 0.603413 MBtu x 333 = 1024 MBtu	•
Number of fixtures = 0.5 / 717) = 359 Energy savings = 836 kwh , 0.603413 MBtu , 359 = 1024 MBtu yr Kwh	-
+1530 7FQ C 1 4 2003	
Europy cost savings = \$15.30 , 359 fixtures = \$9083/yv Modil & Labor cost savings = \$18.63 , 359 = \$6688/yv yr-fixture yr-fixt.	
1 1013 350 41100/m	
Mail & Labor cost savings = \$ 18.65 x 399 = 466 08/7	
Total cost savings = 9083 + 6688 = \$15,771/yv	
Project cost = \$66.73/fusture x 359 \$23,956 (Construction cost = 23,956/1.115 = \$21,485)	
(Construction cost = 23 956/11.11= = \$21.485)	.1
Concertation Cost - Cos	

EYNOLDS, SMITH AND HILLS RCHITECTS · ENGINEERS · PLANNERS INCORPORATED	SCREENING CO DESIGNER T. T	odd	SHEET	790 63 2 of	. 10
GP-N-3 Reduce light leve 150 W Cheandesce	15 - limited	application	ms to rep	lace ex	derior .
150 W Cheandesu	ents with 13 h	of fine	usceni sen	W-IN 16	178/175
- Assume original ligh	t levels can be re	duced by	20-30%		
- Assume non-explos	ion proof appl	lication			
Exergy savings = (1	50 W - 16 W) L	24 hr x 2	60 days =	836 <u>k</u>	wf
			0	0	
Energy cost savings	= 836 kwh.	\$0.03026	= \$ 25.3	30	
	yr.	kurh	y		
Labor & mot'l cost savin	gs = / Incord. cost 750 hr		cost x 6	240 hr	
_[(\$2,11 mod'l + \$1.20			+ \$1.95 labor	×0.683)	× 6240h
750 hr		10,	000 hr		3 gr
	\$ 18.63	our production			
Total lost sivings =	= \$25.30 + \$	18.63 =	\$43.93	1	
	- gr	yr	yr	_	
	32 for fixture p		—		
Layor cost = \$1.20	×1.2 ×0.683	(1057 of HE	flacing incar	ud. + 20	96)
Project cost=[•			66.73
Simple payback = \$	66.73 = 3.93/yr	1.5 yr <	(10 yr =	recomm	ended
				* ************************************	
	1				

7	P	- /	
	O'		æ

SUBJECT	AEP NO
	SHEETOF
DESIGNERPFH	DATE 10/29/90
CHECKER	DATE

QRIP Cale :

Current energy costs:

150 W 224 hr x 260 dn = 1000 x 35 laups x \$0.3026/kwh = = \$10,168/gr.

Current moderial & labor costs:

cost / Daup * 359 * 6240hrs

Z.11 +1.2 × 0.63 × 359 × 6240 = \$8750/yr

New energy conts:

16 * 24 * 260 = 1000 + 359 + 0.03026 = \$1085/gr.

New matil & labor cooks

7.83 +1.95 × 1.68 × 359 × 6240 = \$ 2062/y-

Labor savings

(1.2 × 0.68 = 1.95 × 0.68) + 359 × 6240 = \$ 2140/gr

For fluorescents, replace the lamp only.

Co	
07	

SUBJECT		AEP NO		
		SHEET	OF	
DESIGNER	PH.	DATE		
CHECKER		DATE		_

Current mal'l coste:

New mal'l costs:

(arrent labor:

New Pator:

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
2022 -00	Beater House	NC. B-Line		40	120
2024 -00	Poacher & Blending House	NC. B-Line	3 3	30	90
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	1	7	7
4921 -00	Inspect/Clean NG Tanks *	Cast Prop. (Rocket)	1	21	21
4951 -02	TOW Launch Saw House	Pilot B	1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	ist R P	1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1	130	
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

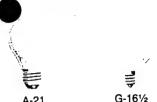
CONSTRUCTION COST	6 SHEET 4 OF 10						
ENERGY ENGINEERING	ANALYS	IS				R ESTIMATE	
RADFORD ARMY AMMUN	CODE & (No design completed)						
ARCHITECT ENGINEER REYNOLDS, SMITH AND	HILLS	A.E.	P I	NC.		CODE C (Final desi	6 7)
ORAWING NO. GP-N-3		EST IM		r. Toôd		CHECKED BY	
	QUANT	TY		LABOR		MATERIAL	
Invani to flucy flood Summary	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL	COST
Replace in landescent	359	fivt.	0.98	352	37.32	13398	13750
floods with 13W PL							
fluorescent floods							
Sales Tax	4.5%					603	603
FICA/In siance	10.0%			70			70
Subtotal				422		14001	14423
Overhead	15.0%		-				2163
Profit	10.07		-				1659
Performance Bond	1.07						182
Herales Support	6.0%						1106
Contingency	10.0%						1953
Construction Cost							21486
					1		

GP-N-3 P. 5 of 10

1000 960 I.F.--Rough Serv.

NCANDESCENT LAMPS















	A-21	G-16	6½ R-40						G-40 .	T.	H-30
Bulb	Base	Prod. Code	Lamp Ordering Code	Volt	Pkg.	Fila- ment Desgn	MOL (In.)	LCL (In.)	Rated Avg. Life Hours	App. Init Lum.	DESCRIPTION See Incandescent footnotes pg. 46
100 W	ATTS (Cont	inued)		120	24	CC-6	6:3/18		2500	1280	Pearl (White)
G-40	Medium	39627	100G40/W	120	-						Globe
G-40	Medium	49781	100G40/W	6PK 120		CC-6	615/16		2500	1280	Pearl (White) Globe. Moonglow Pearl (White)
G-40	Medium	13046	100G40/W/L	120	24	c c-6	617/16		4000		Globe
A-23 A-23 A-23 A-23 A-21	Medium Medium Medium Medium Med.(BB)	18610 18594 18632	100A/B 100A/G 100A/O 100A/R 100A21/TS	120 120 120 120 120	120 120 120	CC-6	5:716	 2 ⁷ / ₁₈	750 750 750 750 3000	1280	*Blue *Green *Orange *Red ClearTraffic Signal. Rated Watts: 98. BDTH (78)
A-21 A-21 A-21	Med.(88) Med.(88) Med.(88)	18386	100A21/TS 100A21/SP 100A21/4SP	130 120 120	120	C-5	4 ³ / ₁ 4 ³ / ₁ 4 ³ / ₁	2 ½ 3 3	3000 200 200	1280 1340	ClearSpotlight Light I.FMed- ical Spotlight
A-23 A-23	Medium Med.(BB)		100A23 100A23/20	120 120					750 1000		Inside Frost ClearCommer- cial Oven
G-16%	S.C.Bay.	18717	100G16%/29SC	120	60	CC-1	3 3	1 3/4	200	1660	ClearSpotlight. BDTH (7,86,99)
G-16% G-16% R-	D.C.Bay. D.C.Bay. Medium	18723	100G16%/29DC 100G16%/29DC ==100R/FL	120 130 120	60	CC-1 CC-6	3 3	13/1	200 200 2000	1660 1660 1190	Reflector flood.
R-40 R-40	Medium Medium		** 100R/FL 100R/SP	130 120		CC-6			2000 2000	1190	Refl. SpotLight I.F. (4,35,56)
T-81/2	Medium	18898	100Т8¼/9	120	24	CC-1	3 5 1/1	3	50	1920	MicroscopeANSI: EDR (22,86,99)
T-10 (HRG)	D.C.Med. Ring	18905	100110/7	6	24	c-6	51/2	2 3/18	50		<pre>ffContour Pro- jector ANSI: CPS (1,86,99)</pre>
T-10 (HRG)	Med.Pref	18907	100T10P	6	24	c-6	5 1/4		50		ffContour Pro- jector ANSI: CPT (1,86,99)
	Medium Med.Side		100A23 100PAR38/FL	12 12	120 12		517 ₁₈ 4 %		1000	1400	Inside Frost (53) PARMine Flood (58)
(HRG) PAR-38	Prong Med.Skir	18824	100PAR38/2FL	12	12	c-e	5 1/15		1000	1400	PARFlood (14.56.96)
(HRG) PAR-64 (HRG)	(BB) Scr.Term	>39394	100PAR64	6	12	C-6	4		. 50		CeilometerVery Narrow Spot. Filament shielded
R-30	Med.(88)	>39503	100R30/CL	12	24	C-6	5 1/8		2000	1200	Reflector Flood Clear (4,14,53)
(HRG) T-8	S.C.Bay.	18881	100TB/1SC	20	24	cc-e	3	2 3/18	50		Clear-Contour Map ANSI: BZA (8,31,61,86,94)
A-21 A-21	Medium Med.(88)		0 100A/RS 5 100A21/3	30 32	120 120	0 C-5	5 1/4 4 3/1	3	1000 500		I.FRough Serv. ClearLocomotive Headlight (13)
	Medium Med.(BB) Scr.Term	>17906	1 100A 5 100A/BB 5 100PAR46	34 34 60	120 120 12	O C-9	51% 51% 2V 3%	8 4 1/18	1000 1000 800	2160	I.FTrain " Mine Locomotive Headlight (71)
(HRG) A-21 A-21 A-21	(BB) Medium Medium Med.(BB)	17983	5 100A 3 100A 5 100A/99	236 256 230 250	0 12 0- 12	O C-7	A 51/4	317/15	1000	1280	Inside Frost " I.FExt, Serv.

Medium

18334 100A/RS

C-17 51/4

120

317/16

> New product listing.

In "base up" use, heat eventually may deteriorate paper-lined or plastic sockets.

Source W x H: 4.5 x 3.0mm. Burn base up.

It Filament offset .100" +-.030" from base axis.

ENERGY SAVING in deep down lights consider the 75ER30 lamp shown on page 23 . The resulting at savings are shown on page 5.

GENERAL ELECTRIC LAMPS

NCANDESCENT LAMPS





INCANDESCENT

R-40

ulb	Base	Prod. Code	Lamp Ordering Code	v	olts	Pkg.	Fila- ment Desgn	MOL (In.)	LCL (In.)	Rated Avg. Life Hours	App. Init Lum.	DESCRIPTION See Incandescent footnotes pg. 46
	ATTS (Cont	inued)	150PAR46/3NSP		125	12	CC-1	3 4		2000	1500	Narrow Spot
HRG)	Prong Med.Side		150PAR46/3MFL		125	12	CC-1	3 4		2000	1500	(11,56,58,96) Medium Flood
HRG)	Prong Scr.Term	19517	150PAR46		125	12	C-13	31/4		1000		(11,56,58,96) Mine Locomotive
HRG)	(BB) 3-Prong		150PAR46/TS		115	12	cc-e	4	-•	6000		Headlight Traffic Signal Stippled Reflector Tapioca
AR-38	Med.Side	44933	150PAR/3VWFL		125	12	C-13	4 % 6		2000		lens cover (2) † MineWide Flood (56,58,96)
HRG)	Prong Med.Side	19497	150PAR/4		125	12	C-13	4 5/:8		2000		1 MineSpot (56,58,96)
	Prong Med.Skir	19509	150PAR/5		125	12	C-13	5 1/:6		2000		1 MineSpot (14,56,96)
	(BB) Scr.Term	19518	150PAR46/3		175	12	C-13	3 1/4		800		Mine. Locomotive Headlight (71)
HRG) -40	(BB) Medium	19797	**150R/FL		120	24	cc-6	6 1/16		2000	1900	Reflector Flood ANSI: DWC (4,14,35,56)
-40	Medium	>16445	150R/FL-1	6PK	120	30	cc-e	6 %		2000	1900	Standard Re- flector Flood (4,14,35,56)
-40 _	Medium	19799	**150R/FL		130	24	c c-6	6 %		2000	1900	Reflector Flood (4,14,35,56)
2-46	Med.(BB)	14715	150R/FL/CVG		130	24	c c-6	6 3/16		2000		>>Refl. Flood COV-R-GUARO** (4,35,56,83)
2-40	Medium	19783	150R/SP		120	24	cc-6	6 %		2000	1900	Refl. SpotLight I.F. (4,14,35,56)
-40	Medium	>16446	150R/SP-1	6PK	120	30	CC-6	6 1/16		2000	1900	Standard Reflector Spot (4,14,35,56)
-40	Medium	19785	15OR/SP		130	24	cc-€	6 %		2000	1900	Reflector Spot Light I.F. (4,14,35,56)
-40	Medium	19844	150R/A		120	24	CC-6	6 1/18		2000		ReflectorAmber (14,35,36)
-40	Medium	19823	150R/B		120	24	cc-e	6 %		2000		Reflector81ue (14,35,36)
40	Medium	19827	150R/BW		120	24	cc-6	6 1/18		2000		ReflectorBlue- White (14,35,36)
-40	Medium	19831	150R/G		120	24	cc-e	6 %		2000		ReflectorGreen (14,35,36)
-40	Medium	19835	150R/PK		120	24	cc-e	6 % 6		2000		ReflectorPink (14,35,36)
-40	Medium	19841	150R/R		120	24	CC-6	6 %		2000		ReflectorRed (14,35,36)
:-40	Medium	19851	150R/Y		120	24	cc-e	6 %15		2000		ReflectorYellow (14,35,36)
-40	Med.(8B)	41627	150R40/PL	6PK	120	24	CC-€	6 %		2000		Reflector Plant Light*Gro and Sho* (4,14,56)
?-40	Medium	44674	150R40/TB		120	24	cc-€	6 % 6		2000		Jewelry Spot Reflector Transparent Daylight Blue (4,14,35,56,76)
-40	Medium	44675	150R40/TB		130	24	cc-€	6 %15		2000		Jewelry Spot Re- flector Transpar- ent Daylight Blue (4,14,35,56,76)
·-25	Med.(BB)	19372	150P25/10		120	60	C-5	4 1/4	3	200	2100	Light I.F Spot- light. Hard glass button

New product listing.

> Teflon** Coated. Teflon is a registered trademark of Dupont.

Operating position horizontal with locating lug up or down, and with lamp supported by bulb rim.

** FOR ENERGY SAVING in deep down lights consider the 75ER30 lamp shown on page 23. The resulting savings are shown on page 5.

			DAI	1	MAN-			BARE			TOTAL
16	6 100 Lighting	CRE	W OUTP	υT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL DEP
600	90 watt	1 E		- 1	26.670	Ç	5,140	645		5,785	6,600
650	135 watt		.21		40		6,905	970		7,875	9,025
700	180 watt		.20		40		7,308	970		8,278	9,475
750	Quartz line, clear, 500 watt		1.1	0	7.270		1,872	175		2,047	2,325
760	1500 watt		.2	0	40		3,427	970		4,397	5,200
800	Incandescent, interior, A21, 100 watt	$ \square$	1.6	0	_5		173	120		293	370
900	A21, 150 watt		1.6	0	5		211	120	,	331	410
000	A23, 200 watt		1.6	0	5		227	120		347	430
200	PS 30, 300 watt		1.6	0	5		330	120	0	450	540
210	PS 35, 500 watt ()		1.8		_5		576	120		696	810
230	PS 52, 1000 watt		1.3	0	6.150		1,525	150		1,675	1,900
240	PS 52, 1500 watt		1.3	0	6.150	ot	2,382	150	-	2,532	2,850
300	R30, 75 wett		1.3	0	6.150		375	150		525	630
400	R40, 150 watt		1.3	0	6.150		408	150		558	670
500	Exterior, PAR 38, 75 watt		1.3	0	6.150		566	150		716	840
600	PAR 38, 150 watt		1.3	0	6.150		525	150		675	795
700	PAR 46, 200 watt		1.1	0	7.270		1,928	175		2,103	2,375
800	PAR 56, 300 watt		1.1	0	7.270		2,193	175		2,368	2,675
000	Guards, fluorescent immp, 4' long		1	- 1	8		375	195		570	695 905
200	8' long		.9	0	8.890	1	535	215		750	3/0
010	RESIDENTIAL FIXTURES									E7 70	67
400	Fluorescent, interior, surface, circline, 32 watt & 40 watt	1 E		-	.400	Ea.	48	9.70		57.70 90	110
500	2' x 2', two U 40 watt		8	·	1		66	24	1		
700	Shallow under cabinet, two 20 watt	\perp		6	.500	\vdash	45	12.15		57.15 60.40	
900	Wall mounted, 41, one 40 watt, with baffle			0	.800		41	19.40	ì	48,15	
2000	incandescent, exterior lantern, wall mounted, 60 watt		1		.500		36	12.15		153	185
2100	Post light, 150W, with 7' post		1	•	2		104	49		28.15	
2500	Lamp holder, weatherproof with 150W PAR	\dashv	1	_	.500		16	12.15		47.15	
2550	With reflector and guard		i 1	2	.667		31	16.15	1	87.70	
2600	Interior pendent, globe with shade, 150 watt		2	0	.400	1-	78	9.70		67.70	1.00
0010	TRACK LIGHTING				4	_	-	~		62	79
0800	Track, 1 circuit, 4' section	116		70	1.190	Ea.	33	29	-	85	105
0100	O SECOURI		1	30	1.510		48	44		125	155
0200	12' section &	+	-	40	1.820	1	81		+	65	82
0300	3 circuits, 4' section		1 1	70	1.190		36	37		85	105
0400	8' section	-	-	30	1.510	1	48	44	+	132	160
0500	8' section 12' section Feed kit, surface mounting			40	1.820		88	12.15		24.15	
1000		+	-	16	.500	1-	12			10.08	
1100	End cover	1	1 1	24	.333		16	12.15		28.15	
1200	Feed kit, stern mounting, 1 circuit	\dashv	+	16	.500	1	16	12.15		28.15	
1300	3 circuit		1 1	16	.500		6.55			12.60	I
2000	Electrical joiner for continuous runs, 1 circuit		+	32	.250	1	12.10	-	_	18.15	_
2100	3 circuit			32	.250		47	12.1	1	59.15	
2200	Fixtures, spottight, 150 PAR		$\overline{}$	16	.500			12.1		113.15	_
3000	Wall washer, 250 watt tungsten halogen	İ	1 1	16	.500		101	12.1		114.15	
3100	Low voltage, 2% watt, 1 circuit		+	16	.500	1	102	12.1		121.15	_
3120	3 circuit		•	16	.500	1 1	109	16.16	-	1	

	Lighting		DAILY	MAN-			BARE C	OST8	TOTA	
16	6 100 Lighting	CREW		HOURS	UNIT	MAT.	LABOR	EQUIP. TOTA	L INCL O	AP .
		1 Elec		1	Ea.	479	24	500	3 565	
100	175 watt metal halide	1	8	1		500	24	52	585	
110	250 watt metal halide	++	8	1		535	24	559	625	
120	150 watt high pressure sodium		8	1		556	24	58	645	
130	250 watt high pressure sodium	+	8	<u> </u>	\vdash	525	24	54	615	
140	72"H 18" sq., 400 watt metal halide		8	1		556	24	58	645	,
150	250 watt high pressure sodium	1	8	1		581	24	60	5 675	5
160	400 watt high pressure sodium	1 '	°	'	'		-			
190	Portable rectangle, 6" high 13.5" x 20"	1 Ele	12	.667	Ea.	293	16.15	30	9.15 34	5
200	175 watt metal halide	1 28	12	.667	Ĭ.	314	16.15		0.15 370	,
5210	250 watt metal halide	++	_	.667		335	16.15	35	1.15 390	,
5220	150 watt high pressure sodium		12	.667		360	16.15		6.15 420	
5230	250 watt high pressure sodium	+	12	_	-	365	16.15		1.15 42	5
5240	8" high 18" x 24", 400 watt metal halide		12	.667		376	16.15		2.15 43	
5250	250 watt high pressure sodium	1	12	.667	\vdash	398	16.15		4.15 460	-
5260	400 watt high pressure sodium		12	.667		324	16.15		0.15 38	
5270	Portable square, 15" high 13.5" sq., 175 watt metal halide	++	12	.667	-	376	16.15		2.15 43	_
5280	250 watt metal halide		12	.667		360	16.15		B. 15 42	_
5290	150 watt high pressure sodium	+	12	.667	1	386	16.15		2.15 45	_
5300	250 watt high pressure sodium		12	.667		355	61	41		
5400	Pendent 16" round/square, 175 watt metal halide	+	3.20	2.500	-	370	72	44		_
5410	250 watt metal halide		2.70	2.960		398	81	47		1
5420	400 watt metal halide	+	2.40	3.330	-	398	61		9 52	_
5430	150 watt high pressure sodium	1	3.20	2.500			72	1 1	0 57	_
5440	250 watt high pressure sodium	+	2.70	2.960		428	81		5 62	
150	400 watt high pressure sodium	- I +	2.40	3.330	١ ٠	454	01	~	~ "	~
					-		-			
0010	LAMP8					240	(195)		43 67	m
0080	Fluorescent, rapid start, cool white, 2' long, 20 watt	1 EN	_	8	Ç	348	215		13 53	_
0100	4' long, 40 watt		.90	8.890		198		1 1	57 80	
0120	3' long, 30 watt	\rightarrow	.90	8.890	-	442	215	1.1		
0150	U-40 watt		.80	10		874	245		85 61	
0170	4' long, 35 watt energy saver	\rightarrow	.90	8.890	_	270	215			25
0200	Slimline, 4' long, 40 watt		.90	8.890		618	215 245			90
0300	8' long, 75 watt	\rightarrow	.80	10	+	577			48 1,0	
0350	8' long, 60 watt energy saver		.80	10		603	245	1 1	65 1.15	
0400	High output, 4' long, 60 watt	\dashv	.90	8.890	-	750	215	1.0		
0500	8' long, 110 watt		.80	1		775	245	1,5	1	
0520	Very high output, 4' long, 110 watt		.90	8.890	_	1.285	215	1,5		
0550	8' long, 215 watt		.70	11.43		1.285	275	2,7		
0600	Mercury vapor, mogul base, deluxe white, 100 watt	\rightarrow	.30	26.67	_	2.142	645	2.7		
0650	175 watt		.30			1,663	645	3.6		
0700	250 watt	\dashv	.30		_	2,968	645		85 3.5	
0800	400 watt		.30	1	U	2.340	645	1	70 7.0	
0900	1000 watt		.20	_	+	5,100	970		94 5,0	
ww.	Metal halide, mogul base, 175 watt		.30		1	3,749	645	5.3		
1000		\perp	.30	_		4,712	645 645		31 5,7	
1000	250 watt		.30			4,386		10,8		
	250 watt () -			40	_	9,894 9,960	970 970	10.9		
1000 1100	400 watt 1000 watt		.20				3/0	10.3		
1000 1100 1200	400 watt		.20	40			070			
1000 1100 1200 1300 1320	400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt		.20 .20	40 40		9,268	970			25
1000 1100 1200 1300 1320 1330	400 watt 1000 watt 1000 watt, 125,000 initial lumens		.20 .20	40 40 26.67	0	9,268 4,712	645	5,3	57 6,1	
1000 1100 1200 1300 1320 1330	400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt		.20 .20 .30	40 40 26.67 26.67	0	9,268 4,712 4,871	645 645	5,3 5,3	\$57 6,1 516 6,3	00
1000 1100 1200 1300 1320 1330 1350	400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt		.20 .20 .30 .30	40 40 26.67 26.67 26.67	0	9,268 4,712 4,871 5,059	645 645 645	5.3 5.3 5.3	357 6,1 516 6,3 704 6,5	00 25
1000 1100 1200 1300 1320 1330 1350 1360 1370	400 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt		.20 .20 .30 .30	40 40 26.67 26.67 26.67 26.67	70	9.268 4.712 4.871 5.059 5.380	645 645 645 645	5,3 5,5 5.0 6,0	257 6,1 516 6,3 704 6,5 225 6,8	00 25 75
1000 1100 1200 1300 1320 1330 1350 1360 1370 1380	400 watt 1000 watt. 1000 watt. 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt 150 watt 250 watt		.20 .20 .30 .30 .30	40 40 26.67 26.67 26.67 26.67 26.67	70	9.268 4,712 4,871 5,059 5,380 5,727	645 645 645 645 645	5.3 5.3 5.3 6.4	357 6,1 516 6,3 704 6,5 525 6,8 372 7,2	00 25 75 250
1000 1100 1200 1300 1320 1330 1350 1360 1370	400 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt 150 watt 250 watt		.20 .20 .30 .30	40 40 26.67 26.67 26.67 26.67 26.67 40	70	9.268 4.712 4.871 5.059 5.380	645 645 645 645	5,3 5,3 5,3 6,4 14,4	357 6,1 516 6,3 704 6,5 525 6,8 372 7,2	25 75 250 200



DONTRACTOR PRICE

GP-N-3 1 pr 9 of 10

STD. PKG

PKAN

PKGS WGHTS LIST

CODE

DESCRIPTION

REFLECTA-STAR -- COMPACT FLUORESCENT FLOODLIGHT-SERIES

		and the state of t			11.5	
10513T		PL5 3.75" Diameter Reflector	10	. 11	64.32	22.16.24
10514T		PL5 4.50° Diameter Reflectories	10	J1 2	64.32	t transfer
10515T		PL5 5.25* Diameter Reflectors	10	11	64.32	£.
10923		PL9Q 3.75" Diameter Reflectorist	10	11	73.14	1 12000
10924		PL9Q 4.50" Diameter Reflector	10 1	11	7314	The state of
10925		PL9Q 5.25" Diameter Reflectors	10:34	-11 mar	7314	9 4 - 0 - 0 - 0
11324		PL13Q 4.50" Diameter Reflector	10	1147	74.54W	are at 1
11325		PL13Q 5.25" Diameter Reflector	10	11	74.64	(ब्रञ्ज)
•	The second second	Gold reflector options		أحيف بالأعالي	1	
-G	((((4. 200))		DD:		5.25	2.63
10000 55		Pink Lens	10	1	4.35	A 2.18
10003-P*		Warmtone Lens	10	1	435	TE 2:10:10
10003-W		Warmtone Frost Lens	10	1	4.35	2.18
10003-WF		Pink Frost Lens	10	1	4.35	2.18
10003-PF		Clear Frost Lens	10	1	3.00	1.50
10003-CF 10003-C		Clear Lens (Standard)	10	1	3.00	1.50
10003-U		Ultraviolet Filter Insert Disk	10	1 .	4.35	2.18
XT-125		Socket extender—extends unit 1.25"	25	4	4.95	2.48

^{&#}x27;IMPORTANT: To order optional lenses or filters, please specify reflector size. The last digit of the product code number for the Reflect-A-Star Series indicates the reflector diameter. "3" indicates 3¾," "4" indicates 4½," and "5" indicates 5¼."

RECESSED DOWNLIGHT KIT*

5111325 5121325 5131325



Clear Reflector Trim Gold Reflector Trim Black Reflector Trim 12 70 176.64 12 70 176.64 12 70 176.64

88.32 88.32 103.32

.

13Quad: 900 lumens as per Bruce Pelton

^{*}The recessed downlight kit consists of a frame-in kit, reflector trim in clear, gold or black Alzak® aluminum and a Reflect-A-Stam models number 11325 with standard reflector and lense.

GP-N-3 P.10 of 10

MicroLampe-FLUORESCENFADAPTOR SERIES

- 14 THE

20510	PL5	50	28	28.17	14.09 ·
20710	PL7	50	28	28.17	14.09 ·
20910	PL9	50	28	28.17	14.09
20 920 213 2 0	PLQ9 PLQ13	50	28 30	39.03 39.03	19.52 19.52

FLUORESCENT REPLACEMENT LAMPS"

40510 40710 40910 41310	5W Fluorescent "PL" lamp 7W Fluorescent "PL" lamp 9W Fluorescent "PL" lamp 13W Fluorescent "PL" lamp	50 4 50 4 50 5 50 6	9.00 4.50 9.00 4.50 10.00 9.00 74.50 10.00 9.75 4.88
40920 41320	9W Fluorescent "PLQ" lamp 13W Fluorescent "PLQ" lamp	50 7 50 8	15.75 7.88 7.88 7.38

CONDITIONS OF SALE

ORDER ACCEPTANCE

Orders are subject to approval at Lumatech corporate headquarters.

Prices are subject to change without notice. Lumatech reserves the right to accept and bill all orders at prices in effect at the time of the shipment.

TERMS

Net 30 days on approved credit only. 11/2% per month will be assessed on past due invoices. Any account submitted for collection is subject to reasonable attorney fees and costs.

FREIGHT

Transportation costs will be pre-paid and billed F.O.B. Oakland, California.

No merchandise may be returned without prior written authorization. Authorization may be requested within 30 days from the date of original shipment. All returns will be subject to a minimum handling and factory inspection charge of 25% of invoiced amounts, plus freight, except on products considered by Lumatech to be defective in workmanship and materials.

CLAIMS FOR DAMAGE OR LOSS IN SHIPMENT

It is the responsibility of the consignee to file a claim with the transportation company in the event of lost or damaged merchandise. Immediately upon receipt of the shipment, the consignee should check for loss or damage, in the event such has occurred the consignee should file a claim with the transportation company promptly.

CANCELLATIONS

Orders are not cancelable except on payment for all costs incurred, engineering work performed, any materials purchased or commitments made on the part of Lumatech. Lumatech reserves the right to assess a minimum cancellation charge equal to 25% of the original purchase price of the order placed by the customer.

PRODUCT SPECIFICATIONS

Subject to change without notice.

CATALOG ERRORS

Every effort is made on the part of Lumatech Corporation to provide accurate pricing, dimensional and physical description information, etc. in our literature and price lists. However, as this information is subject to change without notice, we cannot accept the responsibility for any loss or damages due to informational errors in our publications. We invite your inquiry regarding up to date information.

MINIMUM ORDER

Minimum net invoice amount is \$50.00. Any order under \$50.00 is subject to a \$10.00 handling charge.

LIMITED WARRANTY

The REFLECT-A-STAR® and MicroLamp® series fixtures are warranted to be free from defects in workmanship and materials, as manufactured, for a period of three years from the date of original invoice. Lamps are warranted for 90 days only.

Our invoice covers only replacement or repair at our factory of the defective part(s), to the original purchaser, and excludes any responsibility for labor or freight expense incurred by the purchaser or others, for servicing such claim during the warranty period. Lumatech reserves the right to issue credit, repair or replace defective merchandise, at our option, upon receipt of written notification by the original purchaser of the alleged defect, within the warranty period. Lumatech further reserves the right to examination of the alleged defective product, or proof satisfactory to Lumatech of the defect. This limited warranty is in lieu of all other responsibility for labor costs in connection with the installation, removal or replacement of warranted products, or for any consequential.... damages. Lumatech further reserves the right to refuse to honor the above warranty for any product(s) altered, improperly installed, or installed in application for which not intended.

For Authorized Dealer Contact:



DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVI	Y CAPITAL INVESTM	T PROGRAMS	1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL	NTROL SYMBOL
For use of this form, see AR 5-4; the proponent agency is OCA.	the proponent agency is C					
MC (AMCOM ND)	э. тняט:		4. FROM: CDR AMCCOM		5. DOD COMP NAME	6. DOD COMP CODE
CDK, AMC (ARICKM-FIF) 5001 Fisenhower Avenue				AMSMC-MGP-P (R)	CODE	8. DATE
Alexandria, VA 22333-0001			Rock Island,	IL 61299-6000	W730KK	
9. PROJECT TITLE		10, TYPE OF PRCJECT (Check one)	Check one)	11. AMORTIZATION YEARS/MONTHS	NAS/MONTHS	
Install Turning Vanes in Boiler Ductwork (ECO GP-X-4)	iler	OBILE OF	OSD PIF PECIF	36,630	+ 21,998	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	occur	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE		(Average Annual Sarbigs)	
024		25 yrs.		$\frac{1.7}{(yeary)} oc$	(months)	(amortization)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NO			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	Replace the e gas stream wi	Replace the existing square cor gas stream with rounded elbows.	corner ductwork in Power House 1 ows.	k in Power Hou	ise 1 exit
Existing square corner ductwork increased energy use for both forced draft and induced draft fans.	work increased	l energy use for	r both forced d	raft and induce d save energy.	ed draft fans.	Replacing
				3		
19, SAVINGS DISPOSITION						
Savings are used to reduce energy cos	energy costs.	,		:		
20. OTHER REMARKS (Continue on page 5, if more space is needed)	(popos je soods Ar					

9 6 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2D VR 3D 2D VR 3D 3D 3D 3	рум эрум 4тнум и орум 4тнум и орум 9,792 9,792 2	ти ти	21,988	2D VR 3D VR	3D VR	4TH YR
SAVINGS ALARYILASON MATERIAL EUTILIES MAINTENANCE MA		9,792	9,792	21,988	2D VR	NA OC	AIM IN
ALLARY LABOR/ WENTIME ANTERIAL LASE COSTS TAMBRONTATION LASE COSTS ANTIVAGE TURNAN ENERGY (Identity) ENERGY (Identity) OTHER (Identity) TOTALS 33,780 9,792 ANTIVAGE STANING (IRR) (1) INTERNAL RATE OF RETURN (IRR) (2) SAVINGS TO INVESTMENT RATIO (IV.) ANTIVAGE OF METURN (IRR) (2) SAVINGS TO INVESTMENT RATIO (IV.)	9,792	9,792		21,988			
TRILITIES TRILITIES ANINTENANCE/ TRANSPORTATION ENERGY (Identity) ENERGY (Identity) CONTRACT COSTS CONTR	9,792	9,792		21,988			
TILLTIES TAMBFORTATION TAMBFORTATION LEASE COSTS AALVAGE/ TURNIN ENERGY (Identity) ENERGY (Identity) CONTRACT COSTS A (1) INTERNAL RATE OF RETURN (IRR) (2) SAVINGS TO INVESTMENT RATIO (8/1)	9,792	9,792		21,988			
TRAMEPONTATION TRAMEPONTATION LEASE COSTS ALVAGE/ TURN-IN ENERGY (Identity) CONTRACT COSTS CONTRACT COST	9,792	9,792		21,988			
LEASE COSTS EALVAGE/ TURNIN ENERGY (Identity) ENERGY (Identity) SOUTHER (Identity) OTHER (Identity) TOTALS 33,780 9,792 TOTALS 33,780 9,792 A (1) INTERNAL RATE OF RETURN (IRR) Based on factor and number of years economic life of y	9,792	9,792		21,988			
EALVAGE/ TURNIN TOTALS TOTALS 33,780 9,792 ONIT REMAILS 33,780 9,792 TOTALS 33,780 9,792 A (1) INTERNAL RATE OF RETURN (IRR) Based on factor and number of years economic life of Based on factor and number of years economic life of	9,792	9,792		21,988			
ENERGY (Identity) SN 780 SOUTHER (Identity) TOTALS TOTALS 33,780 9,792 TOTALS 33,780 9,792 A (1) INTERNAL RATE OF RETURN (IRR) Divide estimated project cost Based on factor and number of years economic life of Based on factor and number of years economic life of	9,792	9,792	1 6 1 1 1	21,988		`	
ENERGY (Identity) CONTRACT COSTS OTHER (Identity) TOTALS 33,780 9,792 TOTALS 33,780 9,792 A (1) INTERNAL RATE OF RETURN (IRR) Example estimated project cost Based on factor and number of years economic life of Based on factor and number of years economic life of	9,792	9,792	~ 1 1 1	21,988		1	- 1
OTHER (Identity) TOTALS 33,780 9,792 In internal rate of return (IRR) Divide estimated project cost Based on factor and number of years economic life of Based on factor and number of years economic life of	9,792				21,988	21,988	21,988
TUTALS 33,780 9,792 Internal nate of netunn (IRR) Divide estimated project cost Seed on factor and number of years economic life of Based on factor and number of years economic life of	9,792						
	9,792						
		9,792	9,792	21,988	21,988	21,988	21,988
		PRIORITIZATION					
	by average annual savings	1, 988	1.67 fa	factor. 5, AR 6-4 =	35 & IRR	RR.	
SAVINGS TO INVESTMENT RATIO (8/1)							
N die	11.37	_ 250,004	and divide by present value of investment	seent value of in	vestment		
(Based on economic life 25 years, select discount f	8/1. secount factor from Table	_8/1. factor from Table H-4, App H, Ch. 5, AR 5-4	AR 6-4.				
(3) RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	NA				RIMB.		
Divide estimated project cost by number	by number of manpower space savings	pace mynngs					

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				1
7.7	TNEW SECURITION OF SECURITION	UNIT PRICE	QUANTITY	TOTAL COST	BUDGET ACTIVITY REQUIRED	INDS
EQUIPMENT TYPE	PNOPOSED SOUNCE OF TROCONTENTS	S	7			
w Rounded Elbow Ductwork		. 3,663	10	36,630		
(2)						
(6)						
(1)						
(9)						
(6) TRANSPORTATION (Equipment delinery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION						
(11) TRAINING						
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	OME OPERATIONAL			36,630		
(14) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			36,630		
(116) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			0		
(16) TOTAL (8um of (14) + (15) above)	(15) above)			36,630		.
The state of the s	Provier					

I Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal brooking one bill for the equipment and initial maintenance.

³ Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

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T August 1902									
TZ.		Ś	UMMARY OF SAVI	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	IND DOLLARS)				
		BAVINGS				REAPPLICATION OF SAVINGS	FSAVINGS		
ITEM	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	LEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
•	•	٠	9	e. FROM	10	FROM	A. TO	L FROM	, 10
REQUIREMENTS AND (1) AUTHORIZATIONS ELIMINATED									
(2) REQUIREMENTS ONLY ELIMINATED					,				
(3) MANPOWER RELEASED							·		
(4) TERMINATED							-		
(6) ELIMINATED								-	
MANHOURS SAVED FROM MULTIPLE POSITIONS									
OTHER DOLLAR SAVINGS (7) (Excluding Merpower), e.g., CONTRACT COSTS & UTILITIES			21,988				- 14 (1 m) - 14 (1 m) - 14 (1 m)		
(8)							•		
(8)									
(01)						·			
(11) TOTAL DOLLAR SAVINGS			21,988			,			
6 (1) US Graded (2) US Wage Board (3) DHFN (4) 1HFN (5) Officer (6) WO	Reflect spects	Reflect specific duties being per	rformed with addition	formed with additional manhours svailable (equivalent manyears)	de fequivalens man	veary			

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REGULATORY APPROVAL/COORDINATION	
INVESTMENT STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	occedance with established investment planning.
	•
(Cite regulatory approvate, e.g., TAGO Control No.) (Ex. New Start, TAGO Approved, etc.)	nal, efc.)
A OTHER COORDINATION (Functional Coordination at local level, e.g., Fac Brg, Log. Pers. etc.)	
	DATE (YYMMDD)
26. SUBMITTED BY (Typed name, grade and little of Subordinate Command/Agency or Project SIGNATURE	MONORITY
24 APPROVAL RECOMMENDED BY (MACOM/Approy)	DATE (YVMMDD)
	AUTOVGH
ATNO SECURIO DE CARON DE LA CA	
SIGNATURE SIGNATURE	DATE (YYMNDD)
27. APPROVED BY	AUTOVON
20. OTHER REMARKS (Confd)	

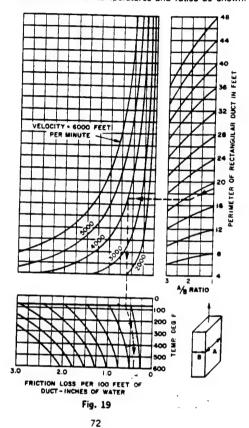
ECO#GP-X-4 INSTALL TURNING VAWES IN BOILER DUCTS PRESSURE DROP WITH EXISTING SQUARE CORNER ASSUME: 5280 FT/min, 300% EXIT GAS TEMP. ASPECT RATIO (WO) =1 FROM FIG 20 (ATTACHED) PRESSURE DROPIS O.B IN.W.C. PRESSURE DROP WITH 24" RADIUS REND IN LIEW of SAVARE CORNER ASSUME G'XG' DUCT $R/D = \frac{24/12}{6} = .333$ FROM F. G 20 AP = 0.28 IN. W.C. FAN ENERGY SAVED ENERGY = (190,000) (0.8 - 0.28) X 746 = 16.56 KW LOAD FACTOR ON FAN 16,56 kw x 8760 Mp x . 5 = 72532 kwh /yr. 72532 Kwh/yr x 3413 Kwh X10-6 MBTU- 248 MBTU/yn Typically 3 boilers operate in wenter and zin assuming 2.5 boilers and 4 elbrus perboiler ques 25 * 4 * 243 mBtn/yr = 2480 msm/yr RSH.

SUBJECT		AEP NO		
		SHEET	OF	
DESIGNER	PFH	DATE		
CHECKER		DATE		

 $\frac{\text{DRIP Cale is}}{\text{Current energy use}} = \frac{(190,000)(0.8)}{6356 \times 0.7} \times \frac{7116}{1000} \times \frac{3760}{2} \times 0.03026 = \frac{$\pm 33.73}{\text{fishow}}$ $\pm 3378 \times 10 \text{ elbows} = \pm 33.730/yv.$

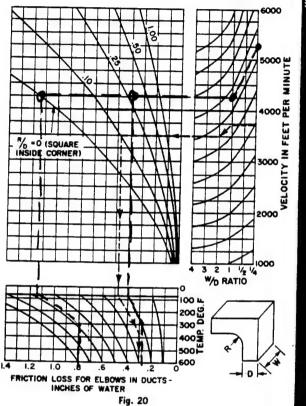
FRICTION LOSS IN RECTANGULAR DUCTS

All of the losses are figured for unlined steel ducts at 70 F and A/B ratio = 1. Correct for other temperatures and ratios as shown.



FRICTION LOSS IN PLAIN RECTANGULAR ELBOWS

All of the losses are figured for unlined steel elbows at 70 F and W/D ratio = 1. Correct for other temperatures and ratios as shown.



73

1	24" RADIUS REND MAT'L COST
	ASSUME: 7 gage PLATE, 6 ST WIDE DUCT., 2/LASTEEL
	AREA
	84 IN X 15t X2TT X 6 St = 18.85 St2/bend
	4
	7 gage pLATE weighs 7.5 LBS/FT2
	1 gage plate weight 1.5 2+6
	18.85 Ft bend x 7.5 LRS / FT2 = 141 LRS / bend
	18.85 Ft/bend X 7.5 / Ft
	Cost
	STEEL PLATE COSTS ABOUT 12/LR FARRICATED
	* MEANS. SPECIALTY STEEL
	141 LBS/bond x 2/1B = \$282/bend.

and the second s

CONSTRUCTION COST	ESTIMA	TE	_	DATE PREPARE	D		SHEET	OF
PROJECT ENERGY ENGINEERING	ΛΝΔΙ Υς	15			BASIS FOR	ESTIM	ATE	
RADFORD ARMY AMMUN					CODE & (No design completed)			
RADFURD ARMY AMMUN	TITON	PLANI					(Final dec	* '
REYNOLDS, SMITH AND	HILLS		-	1C.	□ o T	ER (Spi	ci (y)	
DRAWING NO.		ESTIM	67.	Falloy	ſ	HECKE	Hut	chins
2	QUANT	ITY		LABOR	M	ATERIA		
ROUNDED DUCT SUMMARY CORNER.	OH ETIMU	UNIT MEAS.	PER	TOTAL	PER	TO	FAL	COST
BEND COST MATIC	1	ea			282	ゑ	82	282
LABOR Q9	3	days	346.32	1039				1039
REMOVE Exicting								
CORNER CREW Q9	•5	days	346.32	173		2	81	455
TOTAL		<u> </u>		1212		2	82	1494
LOCATION			.683	828	1.002	2	82	1110
SALES TAX			1.00	828	1.045	2	95	1123
FICA			1.20	994	1.00	2	95	1289
OVERHEAD 15%								1482
PROFIT 10%								1631
BONO 1%								1647
CONTINGENCY 10%								1812
Hercules 6%								1920
TOTAL PER R	1 Bow							1920
- 1 :0 · M								
Five boilers ? 4 elbou	03 Dec	4		•				X20
					-			#
TOTAL CONSTRUCT	TION	000	T		-	-		\$38,400
)					 	:		
					-		•	

C 1, AR 5-4

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 5-4; the proponent agency is OCA.		1. PROJECT NO.	REQUIREMENT CONTROL SYMBOL DD-M(R) 1661	ROL SYMBOL
CDR, AMC (AMCRM-MP) 5001 Eisenhower Avenue Alexandria, VA 22333-0001	\$0 A R	CDR, AMCCOM CDR, AMSMC-MGP-P (R) Rock Island, IL 61299-6000	8. DOD COMP NAME 8. Army 7. COMMAND CODE 8. W73QKK	6. DOD COMP CODE A B. DATE
& PROJECT TITLE	10. TYPE OF PRCJECT (Check one)	iech one) 11. AMORTIZATION YEARS/MONTHS	YEARS/MONTHS	
Modify Boiling Tub Heating Method (ECO NC-X-1)	X QRIP	D PIF	+ 8,630	\$ ×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE 14	14. EXPECTED OPER-	(Average Annual Sarbiga)	EN (Na May
024	25 years	- 1.03 (year)	or (months) (emortization)	(wa)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION	Z		
Administrative Contracting WOLLAA Office Radford Army Ammunition Pt. Radford, VA 24141	A closed heat replace the st	A closed heat exchanger will be installed on one boiling replace the steam percolation method currently in use.	ed on one boiling trently in use.	tub to
The steam percolation method now used a Using a closed heat exchanger to heat the	llows steam to esc the tub contents wi	allows steam to escape from the boiling tub by the tub contents will greatly reduce this heat	by a "puffing" action.	on.
Savings are used to reduce energy costs				
20. OTHER REMARKS (Continue on page 6, if more space is needed)				

C 1, 4R E-1

Particular Par	ŕ				SUMA (ROUND C	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	AVINGS IT DOLLAR)	s Sujass			
Park of the state of the stat				Atta	ech computation sheet a	dentifying the method	of stan to assess our		DIFFERENC	CE/SAVINGS	
Accordance Acc	•	SAVINGS IREAKOUT	PRESENT	1ST YA	20 VR	30 YA	4TH VR	18T YR	20 VR	30 Y.R	ATH YR
Thirties	13 2	NAV/LABOR/ NTIME									
NUTTENAL ALTER OF STATES NUTTENAL ALTER OF STATES NUTTENAL ALTER OF STATES NUTENAL ALTER OF STATES NUTBER OF S	155	ERIAL									
Available Avai	1	TIES									
Activities Act	1	TTENANCE/	,								
ALVAGE. OUT-14 ALVAGE	3	MEPONTATION									
National and project cost National Project cost	3	HE COSTS									
	133	VAGE/ N-IN								\	
Trief (description 14,470 14,47	N N	Rav (Hentity) Coal	23,100	14,470	14,470		14,470	8,630	8,630	8,630	8,630
### ### ### ### ### ### #### #########	ă	TRACT COSTS									
TOTALS 23,100 14,470 14,470 14,470 14,470 8,630 8,630 8,630 THERNAL RATE OF RETURN (IRR) Divide estimated project cost 8,954 by average annual saving 8,630 104,470 104, Gactor. Divide estimated project cost 8,954 by average annual saving 8,630 104, Gactor. Divide estimated project cost 8,954 by average annual saving 8,630 13,34 115,124 and divide by present value of investment Number of grant school of the project from Table H-4, App H, Ch. 6, AR 5-4. Ante of investment fer manifold of the saving 12,9 8/11. Ante of investment fer manifold of the saving 10 in the computation.)	E	iER (Identify)									
INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 8,954 by average annual aavings 8,630 = 1.04 factor. Divide estimated project cost 8,954 by average annual aavings 8,630 = 1.04 factor. Based on factor and number of years economic life of the project, select the IRR from Table H-8, App H, Ch. 6, AR 6-4		TOTALS	23,100	14,470	14,470	14,470		8,630	8,630	8,630	8,630
INTERNAL RATE OF RETURN (183) [Nvide estimated project cost 8, 954 by sverage annual savings 8, 630 - 1.04 factor. [Nvide estimated project cost 8, 954 by sverage annual savings 8, 630 - 1.04 factor. [Nvide estimated project cost 8, 954 by sverage annual savings 8, 630 x discount factor 13, 34 - 115, 124 and divide by present value of investment (undiscounted) 8, 924 - 25 years, select discount factor from Table H-4, App H, Ch. 6, AR 5-4. [Based on scondomic blo 25 years, select discount factor from Table H-4, App H, Ch. 6, AR 5-4. [Manpower requirefents cannot be used in this computation.] [Manpower requirefents cannot be used in this computation.]	1.					PRIORITIZATIO	z				
Multiply annual savings 8,630 x discount factor 13.34 = 115,124 (unditecunited) 8,924 = 12.9 s/l. (Based on economic life 25 years, select discount factor from Table H-4, App H, Ch. 6, Divide settmated project cost by number of manpower space savings (Manpower requirefenite cannot be used in this computation.)	13	INTERNAL RAT Divide estimate Based on facto	re of netrony (IRB) d project cost se and number of y	954	rage annual savings of the project, select	8,630 -	1.04 e H-3, App H, Ch.	ì		IRR.	
Multiply annual savings 8,630 X discount factor 13.34 = 115,124 (undiscounted) 8,924 = 12.9 B/L. (Besed on economic life 25 years, select discount factor from Table H-4, App H, Ch. 6, Ch. 6 investment pen manpower pen manpower space savings (Manpower required project cost by number of manpower space savings (Manpower required for the first computation.)											
NATE OF INVESTMENT PER MANPOWER SPACE (RIMS) NA Divide estimated project cost	2		8,65	30 x discount 12.	factor 13. 3	34 - 115,12	4 and divide by	present value of i	investment		
Divide estimated project cost by number of manpower space savings	3		STMENT PER MANP	OWER SPACE (RIMS)	NA .				2		
		Divide estimat (Manpower req	ed project cost juivalents cannot be	by e used in this compu		er space savings					

33	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS
•	•	٠	•	•	,	
W Closed Heat Exchanger		8,924	-1	8,924		
(2)						
(0)						
(6)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION ³						
(11) TRAINING			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			
(12) OTHER (Specify):					٠	
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	DME OPERATIONAL			8,924		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	UNDING REQUESTED IN THIS PROPOSAL			8,924		5 Ta
(16) TOTAL AMOUNT OF FUNDING REQUIRED I	UNDING REQUIRED FROM OTHER SOURCE			0		
(16) TOTAL (3um of (14) + (15) above)	[15] above)			8,924		
INON to exceed 10% of equipment cost for QRIP projects.	Projects.					

Not to exceed 10% of equipment cost for QRIP projects.

3 Normally not 01A funded

Applicable to OPA QRIP provided cost is included in pachaged deal involving one bill for the equipment and initial maintenence.

Used to compute amortization in Item 11.

Specify source to include certification that funds are evalable, if financed from the regular budget:

C 1, AR 54

5

FUNCTION CODE FROM 10 REAFFLICATION OF SAVINGS TDA PARA AND LINE FROM Reflect specific duties being performed with additional manhours enailable (equinalent manyaars) BUMMARY OF SAVINGS (MANPOWER AND DOLLARS) 5 PROGRAM ELEMENT FROM DOLLARS 8,630 8,630 EA VINGS TYPE NO. MPR REQUIREMENTS AND AUTHORIZATIONS ELIMINATED (Excluding Menpower), 4.5. CONTRACT COSTS & UTILITIES OVERHIRES OR TEMPORARIES TERMINATED MANHOURS SAVED FROM MULTIPLE POSITIONS? OTHER DOLLAR SAVINGS (11) TOTAL DOLLAR SAVINGS BORROWED MILITARY MANPOWER RELEASED REQUIREMENTS ONLY ELIMINATED HOURS OVERTIME TEM (1) US Graded
(2) US Waye Board
(3) DHFN
(4) 1HFN
(5) Officer
(6) WO 1 August 1982 3 3 ŝ 3/91

REGULATORY APPROVAL/COORDINATION

INVESTMENT STATEMENT

This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.

(Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) L OTHER COORDINATION (Functional Coordination at local level, e.g., Fec Eng. Log. Pers. etc.)

DATE (YYMMDD) DATE (YYMMDD) AUTOVON SIGNATURE 25. SUBMITTED BY (Typed name, grade and little of Subordinate Command/Agency or Profect Initiator)

SIGNATURE

36. APPROVAL RECOMMENDED BY (MACOM/Apricy)

DATE (YYMNDD) AUTOVON FOR USE BY HQDA ON OSD PIF PROJECTS ONLY SIGNATURE 27. APPROVED BY

AUTOVON

20. OTHER REMARKS (Conf'd)

H	25	9	1	_
				(2)

SUBJECT	AEP NO
	SHEETOF
DESIGNER ST	DATE 9-24-90
CHECKER	DATE

ECO # NC -X - 1 INSTAL BOILING TUB HEAT EXCHANGER

Hercules dates shows hailing tube consume 1408 485/1402 of 40 psia STEAM for a tub on hail.

1408 LBS/HR/TUB XIII BTUB = 1.654 mBTU/HR/TUB

OTHER DATA SHOWS A TUBIS ON BOIL FOR ABOUT 75% of its cycle

ANNUAL HEAT CONSUMED

1.654 MBTU/HR/TUB X 8760 x .75=10,870 MBTU/yearhue

PERCENT HEAT SAVED BY CONDENSING STEAM

% - hear x100

$$= \frac{919}{1175} \frac{67}{6} \times 100 = 78.2\%$$

ANNUAL HEAT SAVED @ TUBS

10,870 MBTU/year/TUB X . 782 = 8501 MBTU/yr/TUB

ANNUAL COAL SAVING

RSH.

SUBJECT	AEP NO
	SHEET 2 OF
DESIGNER 64	DATE
CHECKER	DATE

NC-X-1

Electricity price differential costs:

\$1.11/mstu 40#STM. X 8501 MBTU = \$9436 /yr /TUB

RSH.

SUBJECT		AEP NO	
		SHEET <u>3</u> OF	
DESIGNER	87	DATE 9/25/90	
CHECKER	WA .	DATE	

CHICULATE # of tubs # used onch year 27,9 ×106 # NC/yr = 30,000 LBS NC/TUB CYCLE = 930 TUB CYCLES Yr

930 TUB CY/4r X100 HR/CY = 10.6 TUBS & 11 TUBS.

assuming 85% AVAILACILITY

11 tubs = 12.9 ~ 13 Tubs,

RAAP COAL ENERGY SAVINGS

11,221 MBTY 4r/TUB X 11 TUBS = 123,431 mBTU COAL/Yr 123,431 * 1.61 = \$198,724/yr.

Electricity Price Differential Costs:

8501 MBHu * #1.11/MBHu *11 tubs = #103,797

RAAP NET SAVINGS \$ 198,724-103,797 = \$ 94,927/yr

RSH	•
	9

SUBJECT	AEP NO
	SHEET 4 OF
DESIGNER	DATE
Ø2X	

NC-X-L

SIMPLE PAYEACK

$$\frac{4_{1/5,993}}{94.927} = 1.2 \text{ yrs}$$

For QIZIP:

TOTAL COAL USED PERTUS

$$\cos T = \frac{\#_{115,993}}{5} = \frac{\#_{8924}}{5}$$

CONSTRUCTION COST	ESTIMAT	ΓE		DATE PREPARED		SHEET	OF
ROJECT ENERGY ENGINEERING	ANALVS	15			BASIS FO	R ESTIMATE	
LOCATION						CODE A (No deerg	
RADFORD ARMY AMMUN	TITON	LANI				CODE C (Final des	
REYNOLDS, SMITH AND	HILLS	A.E.	P., I	1C	07	HER (Spearty)	
ECO# ENC-X-	-1	ESTIM	ATOR	(Agillon		CHECKED BY	
	QUANT	ITY		LABOR		ATERIAL	
PERC. LINE H/X SUMMARY	NO. ETIMU	UNIT	PER	TOTAL	PER	TOTAL	COST
HEAT EXCHANGER							
3" SS 150 LB FLANGE	4	ea	29.00	116	129,15	517	<i>6</i> 33
SS 150 LB 4X3 REDUCE	2	ca	30.00	60	100.00	200	260
3" SCH BO 316 PIPE	20	PT	8.60	172	57.28	1145	1317
4" SCH 40 316 PIPE	20	7-	9,05	181	3 <i>5</i> .56	707	888
Pump							
mecit	1	ea	88	88	1500	1560	1648
ELEC (means pg 277)	1	ea	430	430	290	290	720
INSULATION							
4" pipE - 2"+HK	20	1	2.99	40	5.57	111	171
SUB TOTAL (ONE TUR)				1107		4530	5637
5 7085			1107	5335	4530	22650	28185
LOCATION FACTOR			. 683	3780	1.002	22695	26475
SALES TAX				3780	1,048	23716	27496
FICA INS			1.2	4536	1,00	23716	28252
OVER HEAD 15%							32490
DROFIT 10%							35739
BOND 10%							36096
CONTINGENCY 100%							39706
Hercules 6%							42088
DESIGN FEE 1006							44613
TOVAL							44613
		ļ					
13 Tu6s	15/5						# 115,994
500 NCC包: 1989 11	EANS	1					

OSD PIF

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 6-4; the proponent agency is OCA.	Y CAPITAL INVESTM	ENT PROGRAMS	1. PROJECT NO.		REQUIREMENT C DD-M(I	REQUIREMENT CONTROL SYMBOL DD-M(R) 1661
	3. THRU:		4. FROM:		5. DOD COMP NAME	6. DOD COMP CODE
	CDK, AMC (AMCKM-MP)	(M-MP)	LUK, AMCCON	(a) d-d5)	ACMMAND CODE	A. DATE
Washington, DC 20310-2070	Alexandria, VA	VA 22333-0001		Island, IL 61299-6000	W73QKK	
& PROJECT TITLE		10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	EARS/MONTHS	
Install Variable Frequency Drives on Plant Water Pumps (ECO GP-B-4)	Drives on -4)	OBIF S	X 080 PIF PECIF	• 185,735	+ 96,994	×
12. FUNCTIONAL AREA WHERE BAVINGS WILL OCCUR 0.24	Occur	13, ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cout)	(Average Annual Savbigs)	Serbery (Na Most
		15 yrs.		1.9 or	(months) (emor	(emortization)
15. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	Install variable the water pumped		frequency drives on the water supply pumps will match the water required.	water supply p quired.	umps so that
18 DETAILED JUSTIFICATION	•					4 4 5 7 7 7
Currently, water is pumped from plant usage of about 14,000,000 drives would allow the existing	the Ne gallor pumps	the New River at a cons gallons per day. The r pumps to reduce flow to	we River at a constant rate of about 24,000,000 gallons per day, with a sper day. The remainder is returned to the river. Variable frequency to reduce flow to match the demand.	bout 24,000,000 turned to the n and.	O gallons per d river. Variab	day, with a le frequency
19. 8A VINGS DISPOSITION				:		
		•				
20. OTHER REMARKS (Continue on page 5, if more spece is needed)	or spece is needed)					

				CAC TUE NEAR THE					
			(KOUND OF	(ROUND OF TO THE METHOD and source of data for savings	d source of date for sai	ings			
		Allacu comp	PROPOSED METHOD	AETHOD			DIFFERENCE/SAVING8	/SAVING8	
BREAKOUT	PRESENT	1ST YR	20 VR	3D VR	4TH YR	18T YR	2D VR	3D VR	ATH VR
MALARY/LABOR/ OVERTIME						·			
MATERIAL/ BUPPLIES									
UTILITIES									
MAINTENANCE/ REPAIR									
TRAMBPORTATION	*								
LEASE COSTS									
SALVAGE/ TURN-IN								,	
ENERGY (Identity) Electricity	ity 287,240	190,246	190,246	190,246	190,246	96,994	96,994	96,994	96,994
CONTRACT COSTS									
OTHER (Identify)									
TOTALS	287,240	190,246	190,246	190,246	190,246	96,994	96,994	96,994	96,994
				PRIORITIZATION					
(1) INTERNAL DAride est	Internal mate of metum (IRR), 735 by everage annual savings 96,994 1.91 factor. Divide estimated project cost 185,735 by everage annual savings 96,994 Ph. O. S. AR 6-4 Based on factor and number of years economic life of the project, select the IRR from Table H-3, App H, Ch. S, AR 6-4	185,735 by avera	by average annual savings bit life of the project, select t	96,994 the IRR from Table	1.91 fa	factor. 5, AR 5-4 **	72 * IRR.	ä	
(2) SAVINGS Multiply	Multiply annual envine 96,994	1 1	1 1	851,607	and divide by present value of investment	sent value of in	vestment		
(Based on sconor		years, select discount		Lector from Table H-4, App H, Ch. 6, AR 6-4	6, AR 64.				
(3) MATE OF	NATE OF INVESTMENT PER MANPOWER SPACE (RLMS)	WER SPACE (RIMS)	NA				B IV8		
Divide e	Divide estimated project cost	nyd in this compute	by number of manpower space savings_nuterion.)	r space eavings	•				
(Menpon	(Nenpower requirements connot be never in the conference)								

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS REQUIRED
•		5	•	•	,	
w 600 hp Variable Freq. Drive	ive	97,590		97,590		
400 hp Variable Freq. Drive	ive	66,109	, - 1	60,109		
(a) 100 hp Variable Freq. Dri	Drive	22,036	-1	22,036		
(2)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION			12.5° 2.5° 3.50°			
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION						
(11) TRAINING						
(12) OTHER (Specify):					•	
(11) TOTAL REQUIRED FOR PROJECT TO BECOME OFFRATIONAL	COME OPERATIONAL			185,735		
(14) TOTAL AMOUNT OF	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			185,735		
(16) TOTAL AMOUNT OF	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER BOURCE			0		
(16) TOTAL (Sum of (14) + (15) abour)	+ (15) above)			185,735		
IN a second 108 of professional road for ORIP projects	II emics					

INot to exceed 10% of equipment cast for QRIP projects.

Applicable to OPA QRUP provided cost is included in packaged deal involving one bill for the equipment and initial maintenence.

³ Normally not OPA funded

Used to compute amortitation in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

T T		es .	BUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
		BAVINGS				REAPPLICATION OF SAVINGS	FSAVINGS		
ITEMS	NO. MPR OR MHR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
	•	J	78	e. FROM	ر. to	g. FROM	A. TO	L FROM	, то
(1) AUTHORIZATIONS ELIMINATED									
(3) REQUIREMENTS ONLY ELIMINATED									
BORROWED MILITARY MANPOWER RELEASED									
OVERHIRES OR TEMPORARIES (4) TERMINATED									
HOURS OVERTIME ELIMINATED									
MANHOURS BAVED FROM MULTIPLE POSITIONS?									
OTHER DOLLAR SAVINGS (f) (Excluding Memourn), a.g., CONTRACT COSTS & UTILITIES			96,994						
(0)									
(a)									
(01)						·			
(II) TOTAL BOLLAR SAVINGS			96,994						
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect spectfu	dutes being per	⁷ Reflect specific duties being performed with additional manhours available (equivalent manyears)	uel menhours eveile	ske (equinalens ma	yeard			

REGULATORY APPROVAL/COORDINATION	AL/COORDINATION
INVESTMENT STATEMENT	TATEMENT
4 This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	with existing equipment or facilities. This investment is in accordance with established investment planning. tions, and all other regulatory constraints.
	•
(Cite regulatory approved, e.g., TAGO Control	approvels, e.g., TAGO Control No.) (Ex. New Start, TAGO Approvel, etc.)
A OTHER COORDINATION (Punctional Coordination at local laws, e.g., Fac Eng. Log. Pers. etc.)	
26. SUBMITTED BY (Typed name, grade and little of Subordinate Command/Agency or Project	SIGNATURE (YYMMDD)
(nilibetor)	AUTOVON
38. APPROVAL RECOMMENDED BY (MACOM/Apricy)	SIGNATURE DATE (YYMNDD)
	AUTOVON
FOR 11SK BY HODA ON OSD PIF PROJECTS ON LY	
27. APPROVED BY	
	AUTOVON
20. other remarks (com/4)	

ARCHITECTS	SMITH AND HILLS ENGINEERS INCORPORATED	DESIGNERCHECKER	PEH	s	ATE \$/31/90
	Eco # GP.	B-4			
	Install vario	ble frey	uency christ	u in	main
	. Calculate cu	rrent en	verzy use		
-	Current pro- turbine pun 1-400 hp be current aver	etice is applies poster p age for	1-100 hp ump in co	e 1-6 deep w whin al 4 mille	oo ho sel and tion. The in gal/da.
	Turbine pur				
	kw= voits	e amps.	v3 /1000		
	= 2300	0.127:	J5/ 1000	= 50	6 kW
• •	Deep well	pump:			
	1= WD = 23	300 · 23 ·	V3/1000	= 9	2 kW
	Boooter pu	mp	··· -		
•	kWB = 2	200-130	. 13/1000	= 4	95 kW
	Total kw	= 5067	92+495	.	1093 KW
	Huerage au	nual usa	se = 1093.	3760 =	9,574,680 KWh
	Average ans	mal con	+ = 9,574,	680 40.0	03= \$287,240
	(Ennual was	Lac (MBtv	·) = 9574.66	30 × 3413 =	32,678 M/Stu

SUBJECT

AEP NO

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
1	NCORPORATI	ED	

SUBJECT	AEP NO
	SHEETOF
DESIGNER	DATE
CHECKER	DATE

2. Calculate every savings

Calculate septem head for following current

$$P_{\mu} = 0.70$$
 $P_{\mu} = 0.70$
 $P_{\mu} = 0.95$
 ehp =
$$\frac{6hp}{m}$$
 $kw = 0.75 \times ehp$
 $\frac{6hp}{m} = \frac{6hp}{m} = \frac{6$

$$enp = \underbrace{H \cdot Q}_{2960 \cdot Np \cdot Nm} = \underbrace{kW}_{0.75}$$

$$H = \frac{1093 \cdot 3960 \cdot 0.70 \cdot 0.95}{16,667 \cdot 0.75}$$

Assume static heat is about 150 feet.

REYNOLDS		SMITH	A١	4D	HILLS
ARCHITECTS	•	ENGINEE	RS ·	PL	ANNERS
	ir	CORPORATI	ED		

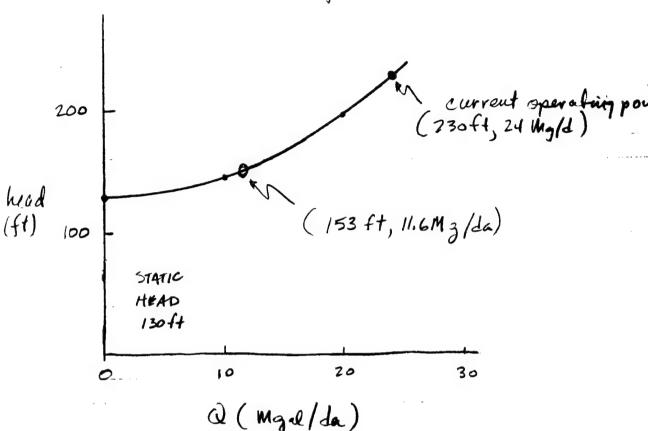
HEET

ET _....

DATE .

DATE

Water Plant Egitur Curve



= current use - rurrent + new board
= current use
$$\left(1 - \frac{Hn}{Ho}\right)$$

= 32,678 MBth $\left(1 - \frac{153}{230}\right)$ =
= 10,940 MBth (electricity)

Project No. (9)

Project No. <u>290-0379-000</u> (904) 281-0394

.ocal		_ L.D		Placed	<u> </u>	Recd	Date _	5/29/90
<u> P.</u>	Hutc	his_		_ Converse	ed with_	Mark	Riffle	
of_w	extingle	oure th	ze. Comp.	Rega	arding _	Variable	Frequency	Driver
14.4				J ~ J		- 10	1 1.	. 14 4
AÑ	K ga	We bu	ager es	rmain	for	variable	speed dr	
			lal	or	max	evials		
	600	hp	\$ 200	0	\$ 60,			
V years and in management	450	hp	\$ 200		\$ 40	000		
	100	hn	\$ 20	990	#12	, 1000		
				· · · · · · · · · · · · · · · · · · ·				
	-			***				
	-							
						-		
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			minutes of a second	W ALL SEE WOOD			and the second s	
		, , we to	-					
				The second of the second		-		
Distribut	ion:							

CONSTRUCTION COST	ESTIMAT	ΓE		DATE PREPARED			SHEET	or
ENERGY ENGINEERING	ANAL YS	15		1	BASIS FO	OR ESTIM	ATE	
RADFORD ARMY AMMUN						_	(No designary	n exemplored). docign).
ARCHITECT ENGINEER	111011	LAIT				CODE 6	(Final de	100
REYNOLDS, SMITH AND	HILLS	A.E.	P., I	NC.	_	CHECKE		
ECO# GP-B-	4	E311m	P	Hutchins	>	CHECK		
VARIABLE SPEED SUMMARY	QUANT	ITY	PER	LABOR	PER	MATERIA	L	TOTAL
DRIVES	UNITS	UNIT MEAS.	UNIT	TOTAL	UNIT	TO	TAL	COST:
1-600 hp VSD		ea		2000		60	000	62,000
1-400 hp VSD	1	ea		2 000		40	,000	42,000
1-100 hp VSD	1	ea		2000		12,	000	14,000
Subtotal				6000		112,	000	118,000
Solos Tay (4.5%)						5	040	5040
FICA / Ins. (20%)				1200				1200
Subtotal				7200		117	,040	124,240
Overhead (15%)								18,636
Profit (10%)								14,288
20nd (196)								1572
Harades Support (60/0)								9524
(ontingency (10%)								16826
, 3								
Construction Cost								1185,086
lendor quete l	Verti	rah	our					
)								

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 5-4; the proponent agency is OCA.	Y CAPITAL INVESTME		1. PROJECT NO.		REQUIREMENT C DD-M(REQUIREMENT CONTROL SYMBOL DD-M(R) 1661
					34444 04600 0000	A DOD COMP CODE
	3. THRU:	102	CDR AMCCOM		Army	A A
HQ. DA (EACA-KMP)	CUK, AMC (AMCKM-FIF)	KM-Fir)		MGP-P (R)	7. COMMAND CODE	8. DATE
Mashington DC 20310_2070	Alexandria VI	VA 2233_0001	щ	sland, IL 61299-6000 W73QKK	W730KK	
A PROJECT TITLE		10, TYPE OF PRCJECT (Check one)		11. AMONTIZATION VEARS/MONTHS	ARS/MONTHS	
Replace Incandescents with 35 W HPS Screw-Ins (ECO GP-N-1)	35 W HPS		X 080 PIF	126,001	+ 65,833	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR		13. ECONOMIC LIFE	14. EXPECTED OPER.	(Project Cott)	(Average Annual Savbres)	1
024				1.9		(emortization)
				(yeard	(months)	,
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION				L
Administrative Contracting	WOLLAA	Replace incandescent high pressure sodium	lamps screw-		explosion-proof fixtures with lamps.	with 35 watt
Radford Army Ammunition Pt. Radford, VA 24141						
18. DETAILED JUSTIFICATION						
High pressure sodium lamps are much more energy efficient than incandescent lamps. color rendition is not critical will save energy.	are much more e tical will save	energy efficie energy.	nt than incande	sscent lamps.	Replacement in areas where	n areas where
HOLLEGE STREET						
18. SAVINGS DISCOSITION				•		
Savings are used to reduce	reduce energy costs.					
20, OTHER REMARKS (Continue on page 5, 1f more space is needed)	(papace je naeded)					

	35				SUMM (ROUND O	SUMMARY OF BOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	LVINGS F DOLLAR)				
Continue Figure				Arrach	h computation sheet id	entifying the method a	and source of data for a	orings	000000000000000000000000000000000000000	8574774 97	
					PROPOSED	METHOD		-	DIFFERENCE	SAVINGS	40.00
	12	VINGS	PRESENT	1ST YR	2D VR	3D VR	4TH YR	18T VA	20 YR	3D VA	ATH TH
	MAN	/LABOR/					•				
11,813 3,572 3,572 3,572 8,241 8,2	MATERI	1	32 968	10,857	1 0	10,857	10,857	2,11	2,11	2,11	•
11,813 3,572 3,572 3,572 8,241 8,2			35,300								
11,613 13,799 13,799 13,799 13,799 13,799 35,481 3	MAINTE	NANCE/	11	3 572	3 572		1 ^	,24		,2	^ [
49,208 13,799 13,799 13,799 13,799 35,481 35,481 35,481 35, 49,208 13,799 13,799 13,799 13,799 35,481 35,481 35,481 35, 94,061 28,228 28,228 28,228 28,228 65,833 65,833 65,833 65,833 65,833 481 65,833 85	MEPAIR		11,613	7/000		· I					
	TRANS	ONTATION									
	LEASE	ST800		·						,	
Tracetty 49,208 13,799 13,799 13,799 13,799 13,799 35,481	FURNA	9E/									- 1
State of Return (LRs)	ENERG	V (Menthy)	49,208	(m	,7	3,79	3,79	2	2	^	5
94,061 28,228 28,228 28,228 28,228 65,833 6	SONTA	ACT COSTS									
TOTALS 94,061 28,228 28,228 28,228 28,228 65,833 6	OTHER	(Identify)									
INTERNAL NATE OF NETURN (IRR) Divide estimated project cost 126,001 by average annual avings 65,833 = 1.91 factor. Read on factor and number of years economic life of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4		OTALS	94,061	28,228	,2	28,228	8,2	5,83	5,83	,83	2
INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 126,001 by average annual savings 65,833 = 1.91 factor. Divide estimated project cost 126,001 by average annual savings 65,833 = 1.91 factor. Based on factor and number of years economic life of the project, select the IRR from Table H-8, App H, Ch. 6, AR 6-4 = 2.78 indiscounted						PRIORITIZATION	-				
Multiply annual savings 65,833 X discount factor 8.78 578,014 (unditecounted) 126,001 = 4.6 8/1. (Based on economic life 15 years, select discount factor from Table H-4, App H, Ch. 5, Ohride estimated project cost bured in this computation.)		INTERNAL RATE	ed project cost 12	6,001	nge annual savings	65,833	1.91 e.H-8, App H, Ch. 6	AB 64		R.	
Multiply annual arting 65,833 X discount factor 8.78 578,014 [undiscounted] 126,001 4.6 8/1. [Besed on economic life 15 year, select discount factor from Table H-4, App H, Ch. 6, Ch.	-										
(undiscounted) 126,001 — 4.0 S/I. (Based on economic life 15 year, select discount factor from Table H-4, App H, Ch. 5, AR 5-4. NATE OF INVESTMENT FER MANPOWER SPACE (RIMS) NA Divide estimated project cost		Kaltiply sonu	NVESTMENT RATIO		ω .	578,01	1 1	resent value of in	vestment		
NATE OF INVESTMENT FER MANPOWER SPACE (RIMS) Divide estimated project cost		(Bused on seco	1) 126,001 nomic life 15			able H-4, App H, Ch	ı. 6, AR 6-4.				
r of manpower space tavings		RATE OF INVI	ESTMENT PER MANP	OWER SPACE (RIMS)	NA				RDV8		
		Divide estima	ted project cost	by a	number of manpow	er space savings					
		(Menpower M	e cours suggested								

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL			
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT		DUANTITY	TOTAL COST	APPROPRIATION, FY FUNDS BUDGET ACTIVITY REQUIRED OR PROGRAM ELEMENT REQUIRED
w 35 watt HPS lamps		. 72.41	1,740	126,001	
(3)					
(5)					
(9)					
(6) TRANSPORTATION (Equipment delbery)					
(7) EQUIPMENT MODIFICATION			12 24 11 11 11		
(8) EQUIPMENT INSTALLATION					
(9) MAINTENANCE CONTRACT ⁸					
(10) FACILITIES MODIFICATION					
(11) TRAINING					
(12) OTHER (Specify):				126,001	
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL			126,001	
(14) TOTAL AMOUNT OF	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			1	
(15) TOTAL AMOUNT OF	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			126,001	
(16) TOTAL (8um of (14) + (15) abour)	+ (15) abour)				
stational (IOC and some security of the Control of	I modern				

I Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged dost involving one bill for the equipment and initial maintenance.

³ Normally not OPA funded.

^{*}Used to compute amortitation in Item 11.

Specify source to include certification that funds are evallable, if financed from the regular budget:

g			36	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS				
			BAVINGS				REAPPLICATION OF SAVINGS	F SAVINGS		
	ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
	•	•	U	9	e. FROM	ر T0	g. FROM	A. 10	L FROM	10
3	NEQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
8	REQUIREMENTS ONLY ELIMINATED									
દે	BORROWED MILITARY MANFOWER RELEASED						iden State Sta State Sta State State State State State State State State State State Sta State Sta State Sta State State Sta Sta Sta Sta Sta Sta Sta Sta Sta Sta			
ર	OVERHIRES ON TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
દે	MANHOURS SAVED FROM MULTIPLE POSITIONS?			8,241						
3	OTHER DOLLAR SAVINGS (Excluding Merpower), e.s., CONTRACT COSTS & UTILITIES			57,592						
9								•		
ê										
(01)										
=	(11) TOTAL DOLLAR SAVINGS			65,833						·
8	(1) US Craded (2) US Wage Board (3) DAFN (4) 1HFN (5) Officer (6) WO	Reflect specific duther being p	c duries being per	erformed with additional manhours available (equivalent manyears)	nal manhours evail	ibke (equivalent ma	t south			

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DATE (YYMNDD) DATE (YYMMDD) DATE (YYMNDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON William II o Banimaniation for Benduntinibu Cavital Investment Promon (DA Form 5105-B)-Continued. (Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE L OTHER COORDINATION (Functional Coordination at local level, e.g., Fac Eng. Log. Pers. etc.) 26. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Indicator) 26. APPROVAL RECOMMENDED BY (MACOM/Apricy) 20. OTHER REMARKS (Confd) 27. APPROVED BY

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REGULATORY APPRO	REGULATORY APPROVAL/COORDINATION	\neg
INVESTMENT	Investment statement	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	e facilities. This investment is in accordance with established investment planning. ory constraints.	
	•	
(Cits regulatory approvals, e.g., TAGO Confir	approvels, e.g., TAGO Control No.) (Ex. New Start, TAGO Approved, etc.)	
, OTHER COORDINATION (Punctional Coordination at local level, e.g., Fac Eng, Log, Pers. etc.)		
16. SUBMITTED BY (Typed name, grade and litts of Subordinate Command/Agency or Project	SIGNATURE DATE (YYMMDD)	
nikeler)	AUTOVON	
B. APPROVAL RECOMMENDED BY (MACOM/Agency)	SIGNATURE DATE (YYMMDD)	
	AUFOVON	
NOR USE BY HODA ON		
27. APPROVED BY	SIGNATURE	
	AUTOVON	
30. OTHER REMARKS (CON'''')		

TECTS .	SMITH AN	D HILLS PLANNERS	DESIGNER		antina fr		HEET	
110	CORPORATED		CHECKER			I	OATE	
GP-N	-1 RE	PLACE !	NCANDES	CENTS	WITH 35	W HP	S SCREA	N-1N5 1
		EXPLO	SION-PI	loof fix	TURES			· · · · · · · · · · · · · · · · · · ·
Calc	ulations	were n	nade o	n a pe	r-unit	basis.	for ins	falling
35 1	w HPS	"buts"	with	i the s	existing i	iplosion	good-	
inca	udes aut	pisture	s. Thes	e unito	consist of	6 a HP	5 lamp	and.
	follast w							
inca	niescent	socket.	the ge	v-unit	Colculation	in are	on page	Z,
From	the buil	ding Aw	weig do	ta, a l	ist was	compiled	of the	
	ings with areas with a ssumed							
fixtu	res (an l	retrof	itted in	the ma	mner des	cribek i	above for	, this ECI
	Total f	ixtures =	- 0,9 (1536)	+ 0.5/=	7(7) =	1740 fictures	4003 H
Ever Ever	Total f	savivas =	\$20.39	x 1740	fixtures	= \$3	35, 479/	yr
(allo				yv-fixture	γ			
Total	l cost sa	vings =	\$ 3547	9 + +	36346	\$65, 8	25/yr	· · ·
Proj	ect cost (Construct	= \$ 80 Fr	0.46 x	1740 fi	ixtures =	\$140,	000	- ·
	(Construct	hou cos	t = 4	149,000	/1.115 =	= \$ 125,	561)	
	ple payb							

	SUBJECT RAAP Lighting Proje	ts AEP NO 790 0379 000
EYNOLDS. SMITH AND HILLS	Screening Calcy, pesigner Total	SHEET OF O
INCORPORATED	CHECKER	DATE
GR-N-1 Replaces intle	of 150-200W incandescen	ts with 35 W HPS
screw-in retro	ret 150-200W incandescen Fits for explosion-proof and	plications *
Energy Savings =	(150 W- 42 W) x 24 hr x	260 Days = 674 kwh
<u> </u>	day	yr yr
	- (71) (£20 20
Energy Cost Savings		\$ 20.39
	yr hwa	J'
Labor & Mat'l lost Sa	rings = / Includ, Cost _ HPS	(ost \ 6240 hm
Labor & Mat'l Cost sa		ohr) ym
a security of the second section of the sec		
= (\$2,11 mote + \$1	. 20 lobor x 0.683 x 1.2 oxp-grt) (\$	16 mat + 76.45 labor × 0.683×1.2)
750	D. hr	16,000 hr
у	6240hr - \$17.44	
	HI W	The second section of the
Total year coning =	\$ 20.39 + \$37.8	3
Total lost savings =	gr yr gr	province province province (b)
	0	
Md'l cost = \$45	for fixture w/ lamp	(1990 render into.)
	. 0	the second secon
Labor $lost = +1.20$	× 1.20 × 1.20 exp-proof x 0.66	Daring ich-prost incont +70%
	[2031 04 14	The state of the s
Bringt Cost=	(1.045 × \$45)+ (1.2 x	\$1.18) ×1.661 = 480.46
Simple payback	= \$ 80.46 = 2.1	yr (10 yr
	= \$ 80.46 = 2.1 \$37.83/yr	
	70	
and the second s		
	and defining the state of the s	
م علا ، ملم ا	e replacedo i the int	ofit ballacts
NUTE; TIS lamps a	re replaceable in the net	our parlasion
	A	- 10 1 34

Q 3

SUBJECT	AEP NO
	SHEETOF
DESIGNER	DATE
CHECKER	DATE

QRIP Celes

Current energy use for 1740 lamps: 150 W × 24 × 260 × 0.03026 × 1740 = \$\frac{49,280/yr}{1000}\$

Current matil ; labor costs :

2.11 +1.2 × 0.68×12 × 62do × 1740 = # 44, 131/yr

Current labor costs

1.2 × 0.68 × 6240 × 1740 = \$11,813/y-

New mergy use

42W x 2d x 260 x 0,03026 x 1740 = \$ 13,799/Jr

New matil & later rosts:

16 + 6.45 x 0.68 x 1.2 x 6240 x 1740 = #14,429/gr

New Labor costs

6.45 x 0.68 x 1.2 x 6240 x 1740 = #3572/y.

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
2022 -00	Beater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3 3	30	90
	C-1 Press & Cutting House		3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
	MK 43 Sawing and Inhibiting		1	4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	1	7	7
	Inspect/Clean NG Tanks *		1	21	21
	TOW Launch Saw House		1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	1st R P	1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1	130	130
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST ESTIMATE					90 SHEET 4 OF 10				
ENERGY ENGINEERING					BASIS FOR ESTIMATE CODE A (No design completed) CODE 8 (Preliminary design)				
RADFORD ARMY AMMUN	IIION F	LANI] cobe 6	(Final des	-	
REYNOLDS, SMITH AND	HILLS	A.E.		INC. OTHER (Specify)					
GP-N-1		ESTIM	T. T	odd	·	CHECK			
Incand to 35 WHE UMMARY	QUANT	TY	PER	LASOR	PER	MATERIA			TAL
	UNITS	MEAS.	UNIT	TOTAL	UNIT		TAL		0ST
Replace incondescent	1740	fixt.	1.18	2053	45.00	+	8300	3	0 353
lamps with 35 w HPS									
screw-in retrofits									
Sales Tax	4.5%						3524		3524
FICA/ Insurance	20,0%	,		411					411
Subtotal				2464		8	1824	-	4288
Overhead	15.0%								2643
Profit	10.0%								9693
Performance Bond	1.0%								1066
Heraites Support	60%								6461
Contingency	10.0%								1415 5566
Construction Cost								12	3366
						<u> </u>			
				1					

GPN-1 p. 5 of 10

ECP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013-TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

MERCURY VAPOR (DELIXE WHITE)		======	CONSUMPTION AND IDE			
MERCIN VAPOR (DELIXE WHITE)	*		TOTAL	LUMENS	HOURS OF	*
**************************************	* WATTS	LINE WATTS			RATED LIFE	*
**************************************	****** MERCUR	Y VAROR (DETUX)	E WHITE)			*
* 400 450 23000 56 24000 *						*
* 175		450				*
* 100 120 4500 42 24000 * 75 93 3150 37 16000 * 50 61 1680 31 16000 * 1500 1600 155000 103 3000 * 1000 1100 110000 100 100 12000 * 400 460 34000 85 15000 * 175 210 14000 85 15000 * 1000 1080 14000 130 24000 * 400 400 480 50000 104 24000 * 250 310 27500 89 24000 * 150 200 16000 80 24000 * 151 50 200 16000 80 24000 * 150 200 16000 86 24000 * 100 135 9500 70 24000 * 20 1850 88 24000 * 20 1850 67 18000 * 20 1800 88 24000 * 20 1800 88 24000 * 20 1800 88 24000 * 20 1800 88 24000 * 20 1800 88 24000 * 30 100 135 9500 70 24000 * 30 100 135 9500 70 24000 * 30 100 135 9500 70 24000 * 30 100 135 9500 70 24000 * 30 100 135 9500 70 24000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 100 135 9500 70 12000 * 30 1000 1000 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 1000 1000 * 30 1000 1000 1000 1000 1000 10000 * 30 1000 1000 1000 1000 1000 10000 * 30 1000 1000 1000 10000 10						*
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		250			2000	*

<u> </u>	LAMP	WATTAGE	APPX LUMENS	AVERAGE LIFE HRS.	STANDA CASE O
	RAPID START FLU	ORESCE	NT U LAMPS	8	
	FB40/U6/CW/EW	34	2,600	12,000	12
	FB40/U6/CW	40	2,950	12,000	12
	INSTANT START SE	IMLINE	FLUORESCI	ENT LAMPS	5
1	F7ZT12/CW	55	4,550	12,000	12
1	F96T12/CW/EW	60	5,600	15,000	15
'(1)	F96T12/CW	75	6,200	12,000	15
	F96T12/CW/HO/EW F96T12/CW/HO F96T12/CW/VHO/EW F96T12/CW/VHO/EW	95 110	8,300 9,200 14,000 15,500	12,000 12,000 12,000 12,000	15 15 15 15
	METAL HALIDE UN			-	
	MH35/U MH50/U	3 5 50	2.300 3.400	5,000 5,000	12
\ ⇌ /	MH70/U	70	5.500	5.000	12
HI	MH100/U	100	7.200	7,500	1 12
	MH150/U	150	12,000	10,000	12
	METAL HALIDE UI	VIVERSA	L BURN MO	GAL BASE	LAMPS
(=)	MH175/U	175	14.000	10,000	12
/ ﷺ ∖	MH175/C/U	175	14,000	10,000	12
	MH250/U	250	20,500	10,000	12
1 - 1 - 1				1 40 000	1
「掌」	MH250/C/U	250	20.500	10,000	12
	MH400/U	400	36,000	20,000	6

MH175/U	175	14,000	10,000	12
MH175/C/U	175	14,000	10,000	12
MH250/U	250	20,500	10,000	12
MH250/C/U	250	20.500	10,000	12
MH400/U	400	36,000	20,000	6
/H400/C/U	400	36.000	20,000	6
MH1000/U	1000	110,000	12,000	6
MH1000/C/U	1000	105,000	12,000	6

COMPACT DOU	COMPACT DOUBLE ENDED HOI METAL HALIDE LAMPS							
HQI 70	70	5,000	10.000	12				
HQI 150	150	11,000	10,000	12				
HQI 250	250	19.000	10,000	12				
HQI 400	400	25.000	10.000	12				

	LU35/MED	35	2.250	16,000	1 12
	LU35/D/MED	35	2,150	16.000	12
	LU50/MED	50	4.000	24,000	12
	LU50/D/MED	50	3.800	24.000	1 12
1	LU70/MED	70	6,300	24,000	12
1	LU70/D/MED	70	5.985	24,000	12
9	LU100/MED	100	9.500	24.000	12
,	LU100/D/MED	100	8.800	24,000	12
	LU150/MED	150	16,000	24.000	12
	LU150/D/MED	150	15.000	24,000	12

0=-20

OLOR IMPROV	בט חוטה ר	neagune a	ODITION DAW	11
NHT50SDX	50	2,500	12,000	12

U50	50	4,000	24,000	12
U50/D	50	3,800	24.000	12
LU70	70	6,300	24.000	1 12
LU70/D	70	5.985	24,000	12
LU100	100	9.500	24.000	12
LU100/D	100	8,800	24.000	12
LU150/55	150	16.000	24,000	12
LU150/55/D	150	15.000	24.000	12

	LAMP	WATTAGE	APPX LUMENS	AVERAGE Life HRS.	CASE CTY.
(3)	HIGH PRESSU	RE SODIUM	E-18 MOGU	L BASE LAI	MP8
	LU200 LU250 LU250/D LU310 LU400	200 250 250 310 400	22,000 29,000 26,000 37,000 50,000	24,000 24,000 24,000 24,000 24,000	12 12 12 12 12

3	LOW PRESSUR	E SODIUM L	AMPS		
	SOX10	10	1,000	9,000	20
	SOX18	18	1,800	14,000	20
	S0X35	35	4.800	18,000	12
	SOX55	55	8,000	18,000	9
l.	S0X90	90	13.500	18,000	9
4	S0X135	135	22.500	18,000	9
	SOX180	180	33,000	18.000	9_

ESX (N)	20	3.300	2,000	20
BAB (W)	20	460	2,000	20
EYR (N)	42	7.300	2.000	20
EYS (M)	42	2.500	2,000	20
EYP (W)	42	1,200	2,000	20
EXT (N)	50	9.150	3.000	20
EXZ (M)	50	3.000	3,000	20
EXN (W)	50	1.500	3,000	20
EYF (N)	75	11.500	3.500	20
EYJ (M)	75	4,500	3.500	20
EYC (W)	75	2.000	3.500	20

	MR16 LINE VOLTA TUNGSTEN HALO			SE	
	M/JDR75W/N	75	6,300	2.000	12
	M/JDR75W/M	75	3.500	2,000	12
	M/JDR75W/W	75	2,100	2.000	12
End.	M/JDR100/N	100	8.500	2.000	12
D	M/JDR100/M	100	4.500	2,000	12
	M/JDR100/W	100	3,000	2.000	12

MR16 LINE VO	LTAGE 120V I LOGEN LAM	NTERMEDI PS	ATE BASE	
I/JDR75W/M I/JDR75W/W I/JDR100/M I/JDR100/W I/JDR100/W	75 75 75 100 100	6.300 3.500 2,100 8.500 4.500 3.000	2.000 2.000 2.000 2.000 2.000 2.000	12 12 12 12 12 12

54484/CL	75	1.200	2.000	15
4484/FR	75	1,140	2.000	15
64486/CL	100	1,600	2.000	15
64486/FR	100	1.520	2.000	15
64488/CL	150	2.760	2.000	15
64488/FR	150	2.622	2.000	15

	TUNGSTEN HALI DOUBLE ENDED		VOLTAGE		
○	0100T3/CL 0150T3/CL 0200T3/CL 0300T3/CL 0500T3/CL 01500T3/CL	100 150 200 300 500 1500	1.600 2.800 3.600 6.000 11.000 33.000	200 200 200 200 200 200 200	12 12 12 12 12 12 12

FAX (718) 853-2390 TEL. (800) 552-3465 · (718) 851-4577 · AMERICAN SCIENTIFIC LIGHTING CORPORATION BROOKLYN, NEW YORK

1	1	T		DAILY	MAN-			BARE	COSTS		TOTAL	1
16	6 100 Lighting	CR	REW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OLP	ı
1600	90 watt	1	Elec	.30	26.670	С	5,140	645		5,785	6,600	1
1650	135 watt			.20	40		6,905	970		7,875	9.025	
1700	180 watt	\top		.20	40		7,308	970		8,278	9,475	I
1750	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2.047	2,325	ı
	1500 watt	\top	†	.20	40		3,427	970		4.397	5,200	1
1760	Incandescent, interior, A21, 100 watt	1		1.60	5	1	173	120		293	370	ı
1800		+-	\vdash	1.60	5		(211)	(20)		331	410	1
1900	A21, 150 watt				5		227	120		347	430	۱
2000	A23, 200 watt		-	1.60		-	330	120		450	540	t
2200	PS 30, 300 watt			1.60	5						810	ı
2210	PS 35, 500 watt ()	+	╄	1.60	5	\dashv	576	120		696		ł
2230	PS 52, 1000 watt	1		1.30	6.150		1,525	150		1,675	1,900	ı
2240	PS 52, 1500 watt	4_	$oldsymbol{ol}}}}}}}}}}}}}}}}}}$	1.30	6.150		2,382	150		2.532	2,850	ł
2300	R30, 75 watt	1		1.30	6.150		375	150		525	630	١
2400	R40, 150 watt	1		1.30	6.150		408	150		558	670	1
2500	Exterior, PAR 38, 75 watt			1.30	6.150		566	150		716	840	1
2600	PAR 38, 150 watt			1.30	6.150		525	150		675	795	1
2700	PAR 46, 200 watt		П	1.10	7.270		1,928	175		2,103	2,375	۱
2800	PAR 56, 300 watt			1.10	7.270		2,193	175		2.368	2,675	l
3000	Guards, fluorescent temp, 4' long	\top		1	8		375	195		570	695	1
3200	8' long			.90	8.890		535	215		750	905	
	RESIDENTIAL FIXTURES	\top	_									Ī
	Fluorescent, interior, surface, circline, 32 watt & 40 watt	1	Elec	20	.400	Ea.	48	9.70		57.70	67	ı
0400	2' x 2', two U 40 watt	+	LEC	8	1		66	24		90	110	1
0500				16	.500		45	12.15		57.15	67	ı
0700	Shallow under cabinet, two 20 watt	+	+	10	.800	\vdash	41	19.40		60.40		1
900	Wall mounted, 41, one 40 watt, with baffle	1		16	.500		36	12.15		48.15	57	ı
2000	Incandescent, exterior lantern, wall mounted, 60 watt	+	+	1		\vdash	104	49		153	185	1
2100	Post light, 150W, with 7' post			4	2					28.15	35	ı
2500	Lamp holder, weatherproof with 150W PAR		+	16	.500	-	16	12.15		47.15		┨
2550	With reflector and guard			12	.667		31	16.15				1
2600	Interior pendent, globe with shade, 150 watt		<u> </u>	20	.400	_	78	9.70		87.70	100	+
0010	TRACK LIGHTING	ı				1						١
0080	Track, 1 circuit, 4' section	1	Elec	6.70	1.190	Ea.	33	29		62	79	4
0100	8' section			5.30	1.510		48	37		85	105	١
0200	12' section			4.40	1.820		81	44		125	155	4
0300	3 circuits, 4' section			6.70	1.190		36	29		65	82	١
0400	8' section	-		5.30	1.510		48	37		85	105	4
0500	8' section 12' section Feed kit, surface mounting	Т		4.40	1.820		88	44		132	160	ı
1000	Feed kit, surface mounting	- }	1	16	.500		12	12.15		24.15	31	_
1100	End cover	1	1	24	.333		1.98	8.10		10.08	14.0	5
	Feed kit, stem mounting, 1 circuit			16	.500		16	12.15		28.15	35	┙
1200	3 circuit		\top	16	.500		16	12.15		28.15	35	
1300				32	.250		6.55		1	12.60	16.1	0
2000	Electrical joiner for continuous runs, 1 circuit	+	+	32	.250	1	12.10			18.15	_	1
2100	3 circuit			1	.500		47	12.15	1	59.15		-
2200	Fixtures, spotlight, 150 PAR	-	+	16			_	12.15		113.15		1
3000	Wall washer, 250 watt tungsten halogen	1		16	.500		101	1	1	114.15		
3100	Low voltage, 25 watt, 1 circuit	-	+-	16	.500	+	102	12.15	+	121.15	-	٦
3120	3 circuit		¥	16	.500	1 +	109	12.15		121.15	140	1

	Lighting		DAILY	MAN-			BARE	COSTS		TOTAL	Γ
16	6 100 Lighting	CREW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OAP	-
5100	175 watt metal halide	1 Ele	8	1	Ea.	479	24		503	565	1
5110	250 watt metal halide		8	1		500	24		524	585	1
5120	150 watt high pressure sodium		8	1		535	24		559	625	١
5130	250 watt high pressure sodium		8	1		556	24		580	645	1
5140	72"H 18" sq., 400 watt metal halide	\top	8	1		525	24		549	615	۱
5150	250 watt high pressure sodium		8	1		556	24		580	645	1
5160	400 watt high pressure sodium		8	1		581	24		605	675	ı
5190	Portable rectangle, 6" high 13.5" x 20"										1
5200	175 watt metal halide	1 Ele	c 12	.667	Ea.	293	16.15		309.15	345	ı
5210	250 watt metal halide		12	.667		314	16.15		330.15	370	1
5220	150 watt high pressure sodium	\Box	12	.667		335	16.15		351.15	390	۱
5230	250 watt high pressure sodium		12	.667		360	16.15		376.15	420	1
5240	8" high 18" x 24", 400 watt metal halide		12	.667		365	16.15		381.15	425	١
5250	250 watt high pressure sodium		12	.667		376	16.15		392.15	435	1
5260	400 watt high pressure sodium		12	.667		398	16.15		414.15	460	۱
5270	Portable square, 15" high 13.5" sq., 175 watt metal halide		12	.667		324	16.15		340.15	380	1
5280	250 watt metal halide		12	.667		376	16.15		392.15	435	۱
5290	150 watt high pressure sodium	1	12	.667		360	16.15		376.15	420	1
5300	250 watt high pressure sodium		12	.667		386	16.15		402.15	450	ı
5400	Pendent 16" round/square, 175 watt metal halide		3.20	2.500		355	61		416	480	1
5410	250 watt metal halide		2.70	2.960		370	72		442	515	١
5420	400 watt metal halide		2.40	3.330		398	81		479	555	┙
5430	150 watt high pressure sodium		3.20	2.500		398	61		459	525	I
5440	250 witt high pressure sodium		2.70	2.960		428	72		500	575	1
0	400 watt high pressure sodium		2.40	3.330		454	81		535	620	١
		1									1
0010	LAMP8										1
0060	Fluorescent, rapid start, cool white, 2' long, 20 watt	1 Ek	c 1	8	С	348	195		543	670	4
0100	4' long, 40 watt		.90	8.890		198	215		413	535	1
0120	3' long, 30 watt		.90	8.890		442	215		657	805	
0150	U-40 watt		.80	10		874	245		1,119	1,325	
0170	4' long, 35 watt energy saver		.90	8.890		270	215		485	615	_
0200	Slimline, 4' long, 40 watt		.90	8.890		618	215		833	995	1
0300	8' long, 75 watt		.80	10		577	245		822	990	4
0350	8' long, 60 watt energy saver		.80	10		603	245		848	1,025	
0400	High output, 4' long, 60 watt		.90	8.890		750	215		965	1,150	_
0500	8' long, 110 watt		.80	10		775	245		1,020	1,200	-
0520	Very high output, 4' long, 110 watt		.90	8.890		1,285	215		1,500	1,725	_
0550	8' long, 215 watt		.70	11.430		1,285	275		1,560	1,825	
0600	Mercury vapor, mogul base, deluxe white, 100 watt		.30	26.670		2,142	645		2,787	3,300	4
0650	175 watt		.30	26.670		1,663	645		2,308	2,775	
0700	250 watt		.30	26.670		2,968	645		3,613	4,225	_
0800	400 watt		.30	26.670		2,340	645		2,985	3,525	
0900	1000 watt		.20	40		5,100	970		6,070	7,025	_
1000	Metal halide, mogul base, 175 watt		.30	26.670		3,749	645		4,394	5,075	
1100	250 watt		.30	26.670		4,712	645		5,357	6,125	_
1200	400 watt		.30	26.670		4,386	645		5,031	5,775	
1300	1000 watt		.20	40		9,894	970		10,864	12,300	
1320	1000 watt, 125,000 initial lumens	\Box	.20	40		9,960	970		10,930	12,400	
1330	1500 watt		.20	40		9.268	970		10,238	11,600	_
	Sodium high pressure, 70 watt	\Box	.30	26.670		4,712	645		5,357	6,125	
50	100 watt		.30	26.670	1 1	4,871	645		5,516	6,300	
1070	150 watt	11	.30	26.670	_	5,059	645		5,704	6,525	
1370	250 watt		.30	26.670	1 i	5,380	645		6,025	6,875	
1380	400 watt	1	.30	26.670		5,727	645		6.372	7,250	
1400			.20	40		13,352	970		14,322	16,100	
1450	1000 watt	\rightarrow	_	26.670		3,963	645		4,608	5,300	
1500	Low pressure, 35 watt	1	.30	ZD.D/1	,,	3.500	-			5,775	

Hunten

Distribution:

(FP-N-1 7.9 of 10

Telephone Call Confirmation

			Project No	2500	379000
1	(718) LD. 851-4577 Pla T. Todd	acad -	Per'd		Data 6-7-90
Local	T. Todd	Conversed W	mecu	Singe	ev.
a Amer	T. Todd nian Scientific Lightin	Conversed W	HPS	retroti	ts
Or		- Negardin	9		

For H	etrofits of incandes	cent fixtu	res, the	"Bull	Lumenight"
and	"Colorlight" products	are recon	mended	, the	lamps are
répla	"Colorlight" products ceable in both are actors costs (includes) as follows:	I the "colo	rlight"	is more	whitish.
Contra	actore costs (inclu	dina lam	Jor Jor	guent	thes of 100+
are	as follows:) (0	0	0
	Bulb Lumenight	35 W	- \$4	5 /	lamps only
	•	50 W	- \$4	5 (to-\$20
	(also come in	70 W 100	W 150	W)	· ·
		,	J	,	
	Colorlight	50 W	- \$67	- (1	amps only \$30)
					U \$ 30)
They	will send a copy	of their	i matal	og S	- dimensions.
	0)			ノ 	



FLUOR-A-LAMPTM SERIES: COMPACT FLUORESCENT LAMPS



GLOBE LAMP/LUMA LAMP

- LAMP: Compact disposable fluorescent globe or tubular lamp/standard or tapered base
- · WATTAGE: Fifteen
- · LUMENS: 720
- . COLOR: Warm white/2800k
- · USE: Indoor only
- . BURNING POSITION: Any
- LAMP LIFÉ: 9,000 hours
- INSTALLATION: Screws into any 120V medium base socket
- PACKAGING: Ten lamps per master carton

CATALOG NUMBER	LAMP	DIMENSIONS
FGL S/15	BFG15 LE/A	Lamp Diameter 3%" Overall Length 6%"
FGL T/15	BFG15 LE/T	Lamp Diameter 3¾* Overall Length 6¾*
FLL S/15	BFT15 LE/A	Lamp Diameter 31/6" Overall Length 63/6"
FLL T/15	BFT15 LE/T	Lamp Diameter 31/s* Overall Length 7*

CONVERT-A-LITETM SERIES: SCREW-IN FLUORESCENT ADAPTER CONVERSIONS



ECONOMY CUP CONVERSION

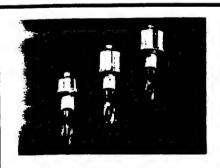
- ADAPTER: Moided Norei® thermal plastic/Sealed and potted to protect internal components
- FINISH: White
- LAMP: Centered on top of adapter/Not dimmable
- INSTALLATION: Adapter screws into any standard 120v medium based socket/No additional wiring or modified circuitry required
- . PACKAGING: Bulk packed/Lamp included



- ADAPTER: Molded Norel® thermal plastic/Sealed to protect internal components
- · FINISH: Black
- LAMP: Centered/Recessed inside of adapter/Not dimmable
- INSTALLATION: Adapter screws into any standard 120v medium base socket/No additional wiring or modified circuitry required/Ratched screw base prevents over tightening
- . PACKAGING: Bulk packed/Lamp included

CATALOG NUMBER	LAMP	DIMENSIONS
		Adapter Diameter 21/5"
CC/5/E	PL5	Overall Length 61/4"
CC/7/E	PL7	Overall Length 71/2"
CC/9/E	PL9	Overall Length 8%"
CC/13/E	PL13	Overall Length 914,4"
CC/Q9/E	Quad 9	Overall Length 65%"
CC/Q13/E	Quad 13	Overall Length 7"
CATALOG NUMBER	LAMP	DIMENSIONS
		Adapter Diameter 2¾"
CC/5/P	PL5	Adapter Diameter 2¾" Overall Length 5½"
CC/5/P CC/7/P	PL5 PL7	
0.0		Overall Length 51/2"
CC/7/P	PL7	Overall Length 51/2" Overall Length 61%,"
CC/7/P CC/9/P	PL7 PL9	Overall Length 5½" Overall Length 6½" Overall Length 8"
CC/7/P CC/9/P CC/13/P	PL7 PL9 PL13	Overall Length 51/2" Overall Length 61%," Overall Length 81" Overall Length 81%,"
CC/7/P CC/9/P CC/13/P CC/Q9/P	PL7 PL9 PL13 QUAD 9	Overall Length 5½" Overall Length 61%," Overall Length 8" Overall Length 8¼," Overall Length 5½"
CC/7/P CC/9/P CC/13/P CC/Q9/P CC/Q13/P	PL7 PL9 PL13 QUAD 9 QUAD 13	Overall Length 5½" Overall Length 61%," Overall Length 8" Overall Length 8¼," Overall Length 5½" Overall Length 6½"

CONVERT-A-LITETM SERIES: SCREW-IN HPS ADAPTER CONVERSIONS



BULB LUMENIGHT™

- ADAPTER: Heavy gauge spun aluminum
- FINISH: Caustic etching
- INSTALLATION: Adapter screws into a standard 120V medium base porcelin socket/No additional wiring or modified circuitry required/Safety weight ground wire
- · PACKAGING: Four per carton/Lamp included

NUMBER_	LAMP	DIMENSIONS
BL/35 BL/50	LU35 LU50	Diameter 31/s" Overall Length 91/s"
B ⊔ 70	LU70	Diameter 31/4" Overall Length 10 1/16"
BL/100 BL/150	LU100 LU150	Diameter 4" Overall Length 101/s"
	Bay Reflector Bay Reflector	DW Direct Wire

AMERICAN SCIENTIFIC LIGHTING CORPORATION

BROOKLYN, NEW YORK

TEL. (800) 522-3465

(718) 851-4577

·FAX (718) 853-2390

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent agency is OCA.	Y CAPITAL INVESTMENT HE PROPOSENT SECULE IN OCK	VT PROGRAMS	1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL DD-M(R) 1561	
	3. THRU:	MD)	4. FROM:		6. DOD COMP NAME	6. DOD COMP CODE
NQ. DA (EACA-KMP) Rm 38719 (Pentagon) Mashington DC 20310-2070	nhow e	er Avenue	Attn: AMSMC-M	AMSMC-MGP-P (R)	7. COMMAND CODE	8. DATE
& PROJECT TITLE		10, TYPE OF PROJECT (Check one)	1	11. AMORTIZATION VEARS/MONTHS	ARS/MONTHS	
Change Incinerator Fuel to Natural Gas (ECO GP-X-6)		OBIL X	X OSD PIF PECIP	• 250,875	+ 78 457	X 12
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR		13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cout)	(Average Annual Savergy)	
				3.2 or (years)	(months) (emorthation)	(tration)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE 17		NOI			1
Administrative Contracting Office Radford Army Ammunition Pt Radford, VA 24141	WOLLAA	Install a na replace #2 f	a natural gas line to the waste #2 fuel oil as combústion fuel.		propellant incinerators	nerators to
					-	
Currently #2 fuel oil is used existing natural gas line to Btu basis.	to incir the inci	nerate the waste p inerator is more e	propellant generated at Radford AAP. Extending t economic due to the lower cost of natural gas on	rated at Radfor the lower cost	d AAP. Extend of natural ga	ing the s on a
19. SAVINGS DISPOSITION						
Cost savings will reduce utility bills	tility bills.			:		
20. OTHER REMARKS (Continue on page 5, If mo.	page 5, If more space is needed)					

į.				SUMMA (ROUND OF.	SUMMARY OF DOLLAR BAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	INGS DOLLAR)	1			
			Attach	computation sheet ide	Attach computation sheet identifying the method and source of data for savings	I source of data joy to	اسلاء	DIFFERENCE/SAVINGS	SAVINGS	
Ĺ	- SORIOS	PRESENT		PROPOSED METHOD	AE I MOD	+	AV TAL	20 VR	3D VR	4TH YR
- 3 8	BREAKOUT ALARY/LABOR/	МЕТНОВ	1ST VR	2D VR	3D YR					
1	LATERIAL/ UPPLIES									
5	TILITIES									
MAINTE	MAINTENANCE/									
3	FRAMEPORTATION									
3	LEASE COSTS								,	
FALVAG	IALVAGE/									
ENE	ENERGY (Identity) Fuel Oil	368,146	289,689	289,689	289,689	289,689	78,457	78,457	78,457	78,457
8	2									
5	OTHER (Identify)									
1	TOTALS	368,146	289,689	289,689	289,689	289,689	78,457	78,457	78,457	78,457
4					PRIORITIZATION					
8	INTERNAL RAT Divide estimate Besed on facto	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 250,875 by average Based on factor and number of years economic life of th	1,875 by average rs economic life of th	re annual savings the project, select	annual savings 78,457 = 3.2 factor. e project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	3.2 fa H-3, App H, Ch. 5,	factor. 6, AR 6-4 =	37 % IRR.	범	
2	SAVINGS TO IN	SAVINGS TO INVESTMENT RATIO (\$1)	9	1. 3.	1 205, 227	7.				
	Multiply annual sevings 250, (undiscounted)	250,875 250,875	X discount factor	tor 15.30 B/I.	H dd	and divide by present value of investment.	ent value of in			
	(Based on economic nie		,							
3		rate of investment per manpower space (<i>Rims</i>)	WER SPACE (RIMS)	NA		•		RDM8.		
	Divide estimat (Manpower re	Divide estimated project cost [Manpower requivalents cannot be used in this computation.]	oy an	by number of manipower space receiption.)						

	COST FOR PROJECT TO RECOME OPERATIONAL	COME OPERATIONAL				1
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	BUDGET ACTIVITY	FY FUNDS
•	•	3	•	•	,	,
w Natural Gas Line		. 250,875		250,875		
(1)						
(6)						
(b)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION ³						
(11) TRAINING						
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	OME OPERATIONAL			250,875		
(14) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			250,875		31.5 45.41 90.70 ()
(16) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE				100 mm (100 mm) (100	
(16) TOTAL (3um of (14) + (15) above)	(15) abose)			250,875		
and the second s	Danieris					

INot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

Ħ	27.		39	UMMARY OF SAV	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
			BAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
	ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	A CODE
	•	•	v	*	e. FROM	f. TO	FROM	, TO	L FROM	10
3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED			•						
8	REQUIREMENTS ONLY ELIMINATED									
3	BORROWED MILITARY MANPOWER RELEASED						##			
3	OVERHINES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
5	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
3	OTHER DOLLAR SAVINGS (Excluding Merpower), e.g., CONTRACT COSTS & UTILITIES			74,457						
€								•		
ê										
(01)										
(II)	(11) TOTAL BOLLAR SAVINGS			74,457						·
*	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO	Reflect specific	: duties being per	formed with addition	Reflect specific duties being performed with additional manhours available (equivalent manyears)	de fequivalens man	(August)			

24.	REGULATORY APPROVAL/COORDINATION	
INVESTMEN	INVESTMENT STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The parties complies with public laws, OSD policies and regulations, and all other regulatory constraints.	or facilities. This investment is in accordance with established investment plannin tory constraints.	٠
	•	
(Cite regulatory approvals, e.g., TAGO Conti	approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.)	
A OTHER COORDINATION (Functional Coordination et local lawi, e.g., Fac Eng. Log. Para. etc.)		
26. SUBMITTED BY (Typed name, grade and title of Subordinete Command/Agency or Profect	SIGNATURE DATE (YYMMDD)	(a)
(Mater)	AUTOVON	
28. APPROVAL RECOMMENDED BY (MACOM/Agency)	SIGNATURE DATE (YYMMDD)	(QC
	AUTOVON	
ON HODA ON	POR 118E BY HODA ON OSD FIF PROJECTS ONLY	
27. APPROVED BY		(aa
	AUTOVON	
20. OTHER REMARKS (Confd)		

-

SURJECT		AEP NO	AEP NO			
		SHEET	OF			
-	G. FALON	DATE ()	14/90			
DESIGNER	P. HUTCHING	DATE 6	111/00			
CHECKER	1 10110 1110	DATE				

ECO# GP-X-6 CHANGE (NCINERATOR FURL TO NAT. GAS
INCINERATOR FUEL COST SAVINGS

FUEL OIL SAVINGS = 86,217 MBPL/yr

NAT GAS INCREASE = 86,217 MATE / yr

Current energy costs: \$368,148/gr.

New energy costs: # 289,689/yr.

Daving = \$ 78,458/yr.

HunTer

Telephone Call Confirmation

Project No. 290 - 03 79 -000
Local L.D. \times Placed \times Rec'd. Date $5-31-90$ Conversed With \xrightarrow{Pat} \xrightarrow{ZEEK}
Of Radford (us. Govn'T) Regarding Jas line for incinciation
Incinciation Gas line - Past study citation.
Date of Study - 59 86
Date of Study - 37 '86 Scope of work - 1e: Incinerator Burners NO Total installed cost - #142,960 +
Total installed cost - \$142,960 +
Ann. Energy Sarings? - (NO.)
How Mucht -
"Put on Pari" Contract With Au Company
is uncle negatistin and proceeding
Any Energy Savings? - NO. How Much - "Put or Pay" Contract With Saw Company is unclei negationin and proceeding slowly.
Original # 87-130,000/40. 10 sing.
200-250k installed cost.
Because of feel sil and natural yes price
Because of fuel sil and natural yes price fluctuation Radford projects as 25-30% Cost saving to senith to natural gas.
Cost saving to seller to nached gas.
Distribution:

ECAM

ECO Number: FN-U-1

COVER THE WATER DRY TANKS WITH HOLLOW PLASTIC SPHERES

Description

The water dry process is used to remove residual ether and alcohol left in the propellant after the solvent recovery process. Open tanks filled with water heated to 149f are used to purge the solvents from the propellant. These tanks are about nine feet high and have a diameter of 16 feet. Approximately 730 MBtu per year of heat is lost from the surface of each water dry tank. Over 86 percent of these losses is due to evaporation and the remainder is conduction.

The surface heat loss can be significantly reduced by adding a layer of two-inch hollow plastic spheres. These spheres would reduce the exposed surface area (the driving force for evaporation) by 85 percent and also improve the U-value of the surface by a factor of two.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that two-inch hollow plastic spheres be used on the surface of the water dry tanks.

Construction Cost	=	\$49,899
Annual Energy Savings (coal)	=	14,421 MBtu
Annual Energy Cost Savings	=	\$23,218
Additional Purchased Electricity	=	\$ 9,143
Reduced Power House O&M	=	\$9,379
Net Cost Savings	=	\$23,454
SIR	=	4.68
Simple Payback	=	2.14 years

PRO FIS	ENERGY TALLATION & L JECT NO. & TI CAL YEAR 1990	CONSERVATION OCATION: RAD TLE: FN-U-1 DISCRETE	N INVESTMENT DFORD AAP COVER WATE E PORTION NAM	UMMARY PROGRAM (ECIP) REGION R DRY TANK WIT E: WATER DRY T 15 YEARS PREPA	LCCID NOS. 3 CENS H PLASTIC BAL ANKS	1.035 US: 3 LS
1.	INVESTMENT A. CONSTRUCT B. SIOH C. DESIGN CO D. ENERGY CR E. SALVAGE V F. TOTAL INV	OST REDIT CALC (I			\$ \$ \$ -\$	49899. 2745. 2994. 50074. 0. 50074.
2.	ENERGY SAVIN	IGS (+) / COS E ANNUAL SAV	ST (-) /INGS, UNIT C	OST & DISCOUNT	ED SAVINGS	
	FUEL	UNIT COST \$/MBTU(1)		ANNUAL \$ SAVINGS(3)		
	A. ELECT B. DIST C. RESID D. NAT G E. COAL	\$ 8.87 \$ 4.27 \$.00 \$.00 \$ 1.61	0. 0. 0. 0. 14421.	\$ 0. \$ 0. \$ 0. \$ 0. \$ 23218.	8.78 12.34 12.05 12.48 10.01	0. 0. 0. 0. 232410.
	F. TOTAL		14421.	\$ 23218.		\$ 232410.
3.	NON ENERGY S	SAVINGS(+) /	COST(-)			
	(1) DISC	RECURRING (+, COUNT FACTOR COUNTED SAVI	/-) (TABLE A) NG/COST (3A X		9.11 \$	
	C. TOTAL NON	N ENERGY DIS	COUNTED SAVIN	NGS(+) /COST(-)	(3A2+3Bd4) \$	2150.
	(1) 25% A 1 B 1 C 1	MAX NON ENE IF 3D1 IS = 1 IF 3D1 IS < 1 IF 3D1B IS =	> 1 GO TO 1	5 X .33) FO ITEM 4 [R = (2F5+3D1)/		
4.	FIRST YEAR [OOLLAR SAVIN	GS 2F3+3A+(3E	BID/(YEARS ECON	OMIC LIFE)) \$	23454.
5.	TOTAL NET D	ISCOUNTED SA	VINGS (2F5+30	C)	\$	234560.
6.	DISCOUNTED S (IF < 1 PRO			(SIR)=(5 /	1F)= 4.68	
7.	SIMPLE PAYB	ACK PERIOD (ESTIMATED)	SPB=1F/4	2.14	

INCORPO	NEERS . PLANNERS	SUBJECT RA COVEV WATEV DESIGNER W CHECKER	P. Hutchin	5	DATE	1 of 6-4-90 6/12/96 SPHERES
Assu	imptions:	- 				
	Heat losses are negle difference	s due to ited due and being	radiation to the indoors	n from low te	the t	ture
2,,	Heat losse are negele in the	es due to exted due ouilding.	convection to the	on From still	the tair co	lank nditions
3,	The avera	ge room 56°F den	condition point.	is are	70 °F 6	db,
4.	The tank Viar, Indo	temperatu strial Stea	ve is 14 m Syster	90F. V n Analys	Vaterla sis for	RAAP.
5.	The tank inventory	diameter printont.	is 16 F	eet. 1	PAAP	building
6,	The evapor equation:	nation vate	is give A (95+0.4. Y	n by -	the fo -pa)	llowing
	ASHRAE HV					20.8.
	<u> </u>					
Calo	ulations:					
	rea of sur		= 17×(8 ft)2 = 201	fe ²	
Q.	conduction =	JA AT	e a compression de manager de service de	er remain administration.		·

QEVAPORATION = M (Cyap + Cp * DT)

REYNOLDS	S. SMITH AND HILLS • ENGINEERS • PLANNERS INCORPORATED	SUBJECT(DESIGNER CHECKER	Cover Wate W.T.T		SHEET _	
-	Plastic Spheres (lo	ntinnea	<u>e)</u> :			
	U TOP = 1/RAIN =	1/0.68	= 1.47	Btu/hr.	ft3.of	
	AT = 149 °F	- 70 °F	= 79 of	and the second of		
	Y=hfg=heat of v	apoviza	tion @ 149	1°F = 100	8.3 Btu/16	Table 4, p.6.15
	Cp = Btu/1	b. °=				
	V = air velocit	y = 1 -	ft/min			
man a secondar della discon-	pw= Sat. Vapo.		_	o _s = 7.394	in.Hg.	ASHRAE Fund. Table 2, p. 6.8
AND ALL OF THE REAL PROPERTY.	pa = Sat. Vapor	Press.	@ 56°F (d.p	t.) = 0.45	2 in.Hg.	ASHRAE Fund. Table 2, p.6.6
-	m evap = 201 (95 + 0.42 008	(7.39c	+-0.452)	= (16/hr)	
	Mevap = 132	16/hr				
	FY 89 WD Cyc		81 FY88 WD	cycles × 2	5×106 #NC	= 377
	377 WD Cycl	es ÷ 15	Active bl	dgs ÷ 2 -	tanks/bldg =	= 12.6 Cycles tank
	FY 88 cycles/to	ank = 1	81 wo cyc	cles ÷8 l	oldgs = 2 tank	sea = 11.3
	Use ~	12 wo	cycles/ta	nk per	year	
	Average cycle	time	= 65000 - 181 C	hours x !	$\frac{day}{24hrs} = 15 \frac{d}{c}$	ycle = 360 hrs cycle

12 cyc/yr × 360 hr/cycle = 4320 hours/yr

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS · PL	ANNERS
IN	CORPORAT	ED	

SUBJECT COVER Water Dry Tank	AEP NO
10.7 7 7/	
DESIGNER W. T. Jodd	DATE

Plostic Spheres (Continued):

$$Q_{\text{Evap}} = 132 \frac{16}{hv} \times 4320 \frac{hr}{4r} \times \left[1008.3 \frac{Btu}{16} + 1 \frac{Btu}{160F} \times (149-53)F\right]$$

$$Q_{\text{Evap}} = 570,240 \frac{16}{yr} \times \left(1008.3 \frac{Btu}{16} + 96 \frac{Btu}{16}\right) = 629.7 \frac{MBtu}{4r}$$

Exposed Ensface Area Reduction By Addition of Plastic Spheres:

minimum:

Maximum = 0.884 (See attached calculations)

Assume 2" plastic spheres with a 1.5" air space

Neglect R-Value of Plastic

Minimum RAISPACE = 0.77 Flz.hr. OF 1981 ASHRAE Fund.
Raje 23.13, Table 2

Usurface = 0.85 x 0.69 BER + 0.15 x 1.47 BER = 0.81 Btu/hr-ft2-06

REYNOLDS	5. SMITH AND HILLS 5. ENGINEERS • PLANNERS INCORPORATED	DESIGNER	over Water D W. T. Toda		AEP NO
	Plastic Spheres (Co.	ntinued	<u>);</u>		
	acond-new = 1)Α <u>Δ</u> Τ = (D. Bl Btu X	201ft2x	79°F×4320 n%r
	<u> </u>	55.6 N	1Btu/yr		····································
	QEvap.new =	PEVOLP X	(1-0.85) = 6	29.7 mBt	× 0.15
	=	94.5	MBtu/yr		
	Steam Savings = (Qo	-	,) * No. Tanks		
, who have a	=[(100	0.8+629.	7) MB+4 - (35	.6 +94.5)	Tanks + 8 bldg
	Savings = 92	186.4 m	n Btu/yr		
	Coal Savings	: -			
	Savings = Ste	an Saving	eteam sour	inga ÷ Dist.	losses
	Energy = 92	86.4 mgt	* 1.32 ÷ 0.85	-= 14,421	.2 mBtu
	Cost = 14,42	1.2 motor	×1-61 /motu	= \$ 23,218	/yr_
^	Electric Purchas				
Cost Iven	2000 = 9286.4 mBt	"s x 0.111	mBtue x \$8,8	7/m stue	= #9143/yr
	Non-Energy Co				
	\$ 1,01 *	9286.4	= \$937	9/yr	

OS. SMITH AND HILLS IS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER THE	SH	P NO S OF S
Plastic Spheres 1	(Continued) =	- 9143 = 4	236 /yr
Cost Savings			
	Coal # Savings -	Elec # increase	2 + Non energy b
	23,218-9143+93		
	23,218 9143 + 13	177 146- 4 7514	54. /yr
Construction Co		177) 17r - + 25, 4	54 /yr
Construction Co		See Constru Estimate	uction Cost
Construction Co Project (ost:	See Constru Estimate S	uction Cost
Construction Co Project (2" polyprop	ost: Cost: #49,899	See Constru Estimate S hollow spheres	uction Cost
Construction Co Project (2" polyprop 500 balls Tr	ost: Fost = \$\\\49,899 Ylene or HDPE	See Constru Estimate S hollow spheres Tft2/case = 10,	uction Cost heet.

Simple Payback

Payback = Cost = Savings = \$49,899 + \$23,454/yr = 2.1 years

Non energy savings = 9286,4 moths x 1.01 mptn = \$9379

CONSTRUCTION COST ESTIMATE				June 4	t, 19	90 SHEET	6 of		
					BASIS FO	R ESTIMATE			
LOCATION	RADFORD ARMY AMMUNITION PLANT					CODE A (No deerign completed)			
ARCHITECT ENGINEER					CODE C (Final design)				
REYNOLDS, SMITH AND	HILLS	A.E.		VC.			A C -		
NA			W.T	· Todd	ſ	CHECKED BY	tours		
Plastic Balls SUMMARY	QUANTI	TY	PER	LABOR	PER	MATERIAL	TOTAL		
	UNITS	MEAS.	UNIT	TOTAL	UNIT	TOTAL	COST		
2" Plastic balls	16	Case	2.50	40.00	123	1968.00	2008.00		
Subfotal				40.00		1968.00			
Location Adjustments			0.683	(12.68)	1.002	3.94			
Sales Tax					4.5%	88.74			
FICA/ Insurance			20%	5.46			5.46		
Subtotal							2093.46		
Overhead	15 %						314.02		
Profit	10 %						240.75		
Performance Bond	170						26.48		
RAAP Support	6 %						160.48		
Contingency	10%						283.52		
J 1									
Construction Cost	plu	Ta	nk				3118.71		
			8 k	mildings x 2	tanks	/ b/da	× 16		
						1			
Total Construction (ost						# 49,899.36		
				·					
Source: Vendor Qu	ote I	50.40	Mid	-America	PI	tics Slace	Kanae MN		
2000 00 1 1 1000	7		, , , , ,	,	i (a.	, cres, sind	Topes,		

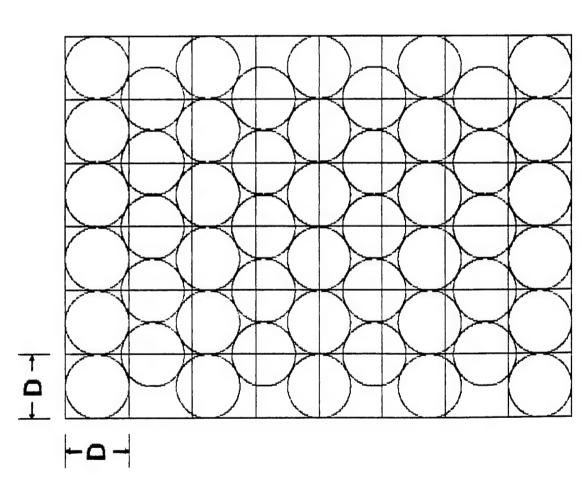
As = Surface Area = 60×80

Ac= Circle Avens = 6 ×9× MD2

C= % Coverage = Ac x100

C= 6x9x TYD2 6Dx8D x 100 C= 9xTY x100 = 9TY x100

C= 88.4%



Cover Water Dry Tanks Based on Statistical Abstract of the United States, 1987 Data PSYCHROMETRIC CHART Ambiant Londitions: 58°F db 50°F wb Room Conditions: Assume R S H 38 (3-63) **Normal Temperatures** Water Dry House Dry Bulb

Telephone Call Confirmation

800-468-1501		Project No	2900379-	000
Local ID	Placed	Rec'd	Date	6/4/90
Local L.D. B. Todd	Conversed			
		•	•	hl
of Mid-America Plasti	CS Regard	ding Hollow	Viastic 3	uneves
1/	<i>H</i> /	,		
Dia = 3/4" 1000	#39.40 / (0	use + ship	ping	
1'2" 1000	\$143.50			
2" 500	\$123.00			
4" 100	#203.00	•		
		-		
PolyPropylene or HD	0E			· ##
- raiginopy lene or An	PC			
		10 france	s voduction	
	2	38.3 Evap	. redution	
		9.5 % +		
			đ	
writer with other	(= 110	10 0 1	10000	
Jones John	r Chall man	4.75) H. A. E.	11(0001	
<u> </u>				
bary will fax proc	fuct info t	to me too	lay.	
	100			
Distribution				

ONE ATOM MON STATE MID SMERICS PLOTES AND STATES

MID-AMERICA PLASTICS, INC.

Plastic Specialists / Fabrication & Distribution 700 Industrial Circle So. Shakepee Minnesota (6337) 612/445-7667 / FAX# 612/445-25/4

DATE:

ro:

ATTN: BILL Todd

Number of pages (Including this cover page): C

REGARDING:

INTO ON PLATE Balls

SIGNATURE () ANY MOUT

Mid-America Plastics, Inc.

MAP FAX # (612) 445-2974



CUT HEAT LOSSES ! SAVE FACTORY MAINTENANCE ! IMPROVE SAFETY ! REMOVE FUMES AND ODORS !

PROVEN to Reduce Fuel Costs 19.5% Reduces Fumes 90% Reducas Evaporation 88.3% ALL PLASTIC FLOATING STARTES

Spheres float or surface of liquid in open tank and thereby greatly reduce the exposed liquid surface aren — up to 90%. Demantically diminishes objectionable "umes and cdo's. Blanket of sensor also insulates heated liquid reducing Evaporation and heat requires

ideal for plating tanks and similar open tank metallations where the figured surface can be covered with a blanker of spheres without impeding access to the tank for process purposes:

Sphere; and hollow and will float on any liquid. Fully maind. No well or rim on which chemicals can deposit and being smooth they ensure a much tighter surface cover.

Polypropylene, non-texic and able to withstand continuous working temperatures of \$10°C (230°F) polypropylene is suitable for use in most known chemicals.

High Density Polyethylene generally suitable as above but with a continuous working temperatures in mitation of 80°C (176°F) softening point about 110°C (230°F). High density polyethylene has better chemical resistance to seriain corripounds like oil, and other hydrocarbons. Also less stress cracking at low temperatures than oof-propylene. Color white translucent except 100 MIM, black for outside use.





POLYPROPYLERS	JULY ENDITY Y	MARI SIDAS
Stock Price Pr.	Stock Price Pr No. Gain	Diameter Approx. So Required As in
		Per Su FL A Care

Plasific Spiscialists / Fubrication & Distribution

700 Industrial Circle S. Strakopee Minnesota 55376 Phone 612 445-7867

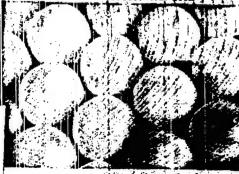
APPLICATIONS

METAL WERKING - In Pleasing and Chromating

Tanks.
PLATINIS: Manual Chromium Line Reduces Spray

Splashing PETROLEUM: Air Pollution, Novious Odors, Waste Collection Pits. FOCID: Reduces Vapor, Small in Bacon Manufac-

turing.
POWER STATION: Surge Tank Reservoir of Hot
Boiler -- No Steam.
SWIMMING PROLS: Reduces Heat Loss



UH 138 ECO Number: GP-N-8

REPLACE INCANDESCENTS WITH COLOR-CORRECTED HPS SCREW-INS FOR EXPLOSION-PROOF

FIXTURES

<u>Discussion</u>

Many buildings at RAAP are lit by inefficient incandescent lighting for interior areas. This ECO evaluates replacement of the incandescent lamps in explosion-proof fixtures with 50 watt color-corrected HPS units, which consist of HPS lamps and ballasts with a medium base adapter which screws into the incandescent socket. These lamps have been color-corrected to produce a whitish light rather than a yellowish light usually associated with HPS. At the present time, these lamps are only produced in this wattage (50 W). Light levels will be decreased 33 percent when 200 W incandescents (3,710 lumens) are replaced by 50 W color-corrected HPS (2,500 lumens). When 150 W incandescents are replaced by 50 W color-corrected HPS, light levels will decrease 13 percent, from 2,880 lumens to 2,500 lumens.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that 50 W HPS screw-in retrofits be installed in the interior incandescent explosion-proof fixtures.

Construction Cost = \$147,062

Energy Savings = 2,354 MBtu/yr

(electricity)

Cost Savings = \$31,081/yr

SIR = 1.87

Simple Payback = 4.8 years

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: GPN8 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.035 INSTALLATION & LOCATION: RADFORD AAP REGION NOS. 3 CENSUS: 3 REPLACE INCAND. W/ COLOR-CORRECT HPS PROJECT NO. & TITLE: GP-N-8 FISCAL YEAR 1990 DISCRETE PORTION NAME: TOTAL ANALYSIS DATE: 10-05-90 ECONOMIC LIFE 15 YEARS PREPARED BY: T. TODD INVESTMENT 147062. A. CONSTRUCTION COST \$ 8089. B. SIOH 8824. C. DESIGN COST 147578. D. ENERGY CREDIT CALC (1A+1B+1C)X.9 0. E. SALVAGE VALUE COST 147578. F. TOTAL INVESTMENT (1D-1E) 2. ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS DISCOUNTED DISCOUNT ANNUAL \$ UNIT COST SAVINGS SAVINGS(5) \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) FUEL 183218. 8.87 2354. 20868. 8.78 A. ELECT 0. .00 0. 12.34 \$ 0. B. DIST .00 \$ 12.05 0. 0. \$ 0. RESID 0. 0. 0. 0. \$ 12.48 D. NAT G 0. \$ 0. 10.01 .00 E. COAL 183218. 2354. \$ 20868. F. TOTAL NON ENERGY SAVINGS(+) / COST(-) 10213. \$ ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 9.11 93040. (2) DISCOUNTED SAVING/COST (3A X 3A1) C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) /COST(-) (3A2+3Bd4) \$ 93040. PROJECT NON ENERGY QUALIFICATION TEST \$ 60462. (1) 25% MAX NON ENERGY CALC (2F5 X .33) A IF 3D1 IS = OR > 3C GO TO ITEM 4 B IF 3D1 IS < 3C CALC SIR = (2F5+3D1)/1F)= 1.65 C IF 3D1B IS = > 1 GO TO ITEM 4 D IF 3D1B IS < 1 PROJECT DOES NOT QUALIFY 4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1D/(YEARS ECONOMIC LIFE)) \$ 31081. 276258. 5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) (SIR)=(5 / 1F)= 1.876. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY)

4.75

7. SIMPLE PAYBACK PERIOD (ESTIMATED) SPB=1F/4

	K	CAAP Lighting Projec	TS AEP NO 290 0379 000
TENNOLDS SMITH AND HILLS	3033401		SHEET OF 10
REYNOLDS. SMITH AND HILLS ARCHITECTS . ENGINEERS . PLANNERS	DESIGNER	T. Todd	DATE
INCORPORATED	CHECKER		DATE
GP-N-8 REPLACE	INCAND	ESCENTS WITH COLO	R-CORRECTED HPS
SCREW-IN	S FOR	EXPLOSION PROOF F	XTURES
(a) culationes were made	le ou a	per-unit basis for	installing 50 W
HPS color-corrected	unto wit	him the existing of	losion-proof
includescent fixture	s. the p	er-unt calculations	are ou page Z.
O.D. mean operation 35	hits I dan	. 5 days whe were c	oundered ()
From the bulding Au	wey dat	a, a list of the bou	ore or page Z. onudered D Idings with potential
incondercent lighting			
assumed for this E	10 the	t 90% of the int	enor fixtures are
Joseph Marie			nner, Exact dimensions
of fixtures and seven	-we re	trofits should be	verified.
		. •	<i>U</i>
Total fixtures - 0.	9 (1536) = 1382	
			82 fixtures = 2354 MBtu
Energy Sautras	HV HV	K D. W.S. M. S. W. J.	82 fixtures = 2354 MEtu
)	0	PVC V	3
Emeran cost surings =	\$ 15.11	, 138Z = \$20 88	32/gr
3	w-tixtu	+ 1382 = \$20,88	
	•		1
Holl & Labor Cost So	viras =	47.39 1382 = \$ 9v.fixt.	10, 213 /4/
Total out South	20 6	82 + 10.213 = \$3	01.095 /41
10141 (051 340124)	2 70	82 + 10,213 = †3	
Project cost = +	118.65 x	1382 = 4163,9	74
(Construction	cost =	\$163,974/L115 =	\$ 147,062)
a commence commence			e en man
simple Tourse	\$ 31 NO	374 = 5.3 yr	
	- VIII	10	

REYNOLDS. SMITH AND HILLS ARCHITECTS · ENGINEERS · PLANNERS INCORPORATED	SCHERMAN Calcs. DESIGNER T. Todd CHECKER	ects AEP NO 230 0379000 SHEET 2 OF 10 DATE DATE
GP-N-8 Replace inten	ior 150-200 W incoudes	courts with 50 W HPS
- Assume color ren 50 W HPS (color excled requireme	dition is important in corrected) is chosen en ents.	this area, so the
Energy Savings = (158	5W-70W) x 24 hr x 260	yes = 499 kwh
Energy cost savings =	499 kwh x \$0.0302 kwh	6 - \$15.11 gr
Labor + Motl cost sa.	rings - Inraud cost - + 790 hr 1	(PS cost) x 6240 hr
=[(\$2.11 mate + \$1.20 la		we + \$6.45 labor × 0.683 × 1.2)
total cost savings	$= \frac{415.11}{yv} + \frac{57.39}{yv} =$	\$ 22.50 yv
Matll (05t = \$ 67.00	for fixture w/lamp	(1390 otnave into,)
Labor cost = \$1.20 x	1.20 Hotel x 1. Z expression	×0.683 = \$1.18
Project Cost =[(1.045 x \$ 67.00) + (1.2 x	\$1.18)] x1.661 = \$118.65
Simple pauback =	$\frac{$118.65}{$22.50/yv} = 5.3$	yr < 10 yr
Wales HTC 14: 15	a replaceable i the He	both ballacte

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC. A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green. C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
2019 -00	Boiling Tub House	NC. B-Line	3	50	150
2017 -00	Beater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3	30	90
2513 -00	C-1 Press & Cutting House	Green. C-Line	3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	Forced Air Dry House LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	ī	7	7
4921 -00	Inspect/Clean NG Tanks *	Cast Prop. (Rocket)	1	21	21
	TOW Launch Saw House	Pilot B	1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	ist R P	1	20	20
7113 -00	Roll House (Rolled Powder)	ist R P (F-Line)	1	130	130
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST	ESTIMA	ΓE		DATE PREPARED 6/90		SHEET 4	or 10	
ENERGY ENGINEERING	BASIS FOR ESTIMATE							
RADFORD ARMY AMMUNITION PLANT						CODE & (Preliminary design)		
REYNOLDS, SMITH AND HILLS A.E.P., INC.						ER (Specify)		
GP-N-8		ESTIM	T. Too	dd.	C	HECKED BY		
Incard to 50W HP3 SUMMARY	QUANT			LABOR		TERIAL	TOTAL	
SUMMARY SUMMARY	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL	COST	
Replace incandescent	1382	fixt	1.18	1631	67.00	92594	94225	
lamps with 50 W HPS								
screw-in retrofits								
Sales Tax	4.5%					4167	4167	
FICA/Insurance	20.0%			326		1,61	326	
Subtotal	2011/6			1957		96761	98718	
Overhead	15.0%						14808	
Profit	10.0%						11353	
Performance Bond	1.0%						1249	
Hercutes Support	6.07						7568	
Contingency (10.0%						13370	
Construction Cost							147066	
	-							
NC EORM								

GP-N-8 p.5 of 10

SCP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013-TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

WATTS	LINE WATTS	TOTAL LUMEN CUTPUT	LUMENS PER WATT	HOURS OF RATED LIFE	*
******* MERCUR	Y VAPOR (DELUX			24000	*
1000	1075	63000 23000	5 9 56	24000 24000	*
400 250	450 290	13000	42	24000	-
175	205	8500	49	24000	*
100	120	4500	42	24000	*
75	93	3150	37	16000	*
50	61	1680	31	16000	
****** METAL	HALIDE				*
1500	1600	155000	103	3000	*
1000	1100	110000	100	12000	*
400	460	34000	85	15000	
175	210	14000	85	7500 	
******* HIGH	PRESSURE SODIUM	1			*
1000	1080	140000	130	24000	π •
400	480	50000	104	24000	
* 250	310	27500	89	24000 24000	*
150	200	16000	8 0 70	24000	*
100_	135	9500 5800		24000	* *
70 50	25 70	4000	57	(24000)	*
* (35)	(42)	2850	67	18000	*
********FWORE	SCENT		:=== == === === == = :		*
STRAIGHT 40	48	3150	66	20000+	*
CIRCLINE 32	37	1830	50	12000+	*
CIRCLINE 22	25 _	1050	42	12000+	*
CIRCLINE 20	23	850	37	12000+	*
TWIN TUBE 13	16	900	5 6 5 0	10000+ 10000+	*
TWIN TUBE 9	12 11	600 400	3 6	7500+	*
STRAIGHT 8 TWIN TUBE 7	10	400	40	10000+	*
STRAIGHT 6	9	300	33	7500+	*
TWIN TUBE 5	8	250	31	10000+	*
======================================	DESCENT				*
* 1000	1000	23740	24	1000	***
* 750	750	17040	23	1000	. #
* 50 0	500	10850	22	1000	- +
200	200	3710	19	750	*
* (50)	150	2880	19	<u>750</u>	*
* 100 75	100 75	1750 1190	18 16	750 750	#-
9	S—IODINF.				*
* 1500	1530	35800	24	3000	*
* 1000	1000	23400	23	2000	*
1000					
* 500 * 250	500 2 50	10950 485 0	22 	2600 2000	<u>~</u>

STANDAND CASE OTY.

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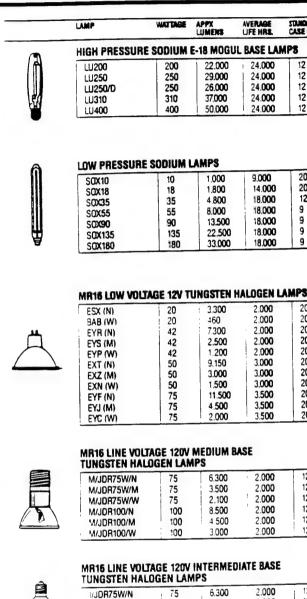
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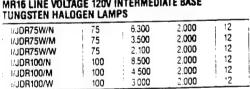
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LAMP	WATTAGE	APTX LUMENS	AVERAGE LIFE HRS.	CASE OT
RAPID START	EI IINDE S CE	NT II I AMP	8	
FB40/U6/CW/E		2,600	12,000	1 12
FB40/U6/CW	40	2.950	12,000	12
INSTANT STAR	T SLIMLINE	FLUORESC	ENT LAMP	S
F72T12/CW	55	4.550	12.000	12
F96T12/CW/EW	/ 60	5.600	15,000	15
F96T12/CW	75	6.200	12,000	15
METAL HALIDI	E UNIVERSA 35	L BURN ME 2.300	DIUM BAS	E LAMPS
METAL HALID	E UNIVERSA	L BUNN ME	DIUM BAS	LAMP
MH35/U				
MH50/U	: 50 : 70	3,4 00 5, 500	5.0 00 5.0 00	12 . 12
MH70/U MH100/U	100	7.200	7.500	12
MH150/U	150	12,000	10.000	12
				141100
METAL HALID				
MH175/U	175 175	14,000	10.000	12
MH175/C/U MH250/U	250	20.500	10,000	12
MH250/C/U	250	20.500	10.000	12
MH400/U	400	36.000	20.000	6
MH400/C/U	400	36,000	20.000	6
MH1000/U	1000	110,000 105,000	12.000	6
MH1000/C/U				
COMPACT DO				
HQ1 70	70	5.000	10.000	1 12
HQI 150	150 250	11.00 0 19.000	10.000	1 12
∺Ql 250 ∹Ql 400	400	25.000	10.000	• 12
HIGH PRESSU				
_U35.MED	35	2.250	16.000	
LU35/D/MED	35	2.1 50 4.000	16.000 24.000	12
LU50/MED LU50/D/MED	50 50	3.800	24.000	1 12
CULINICU				
	70	6.300	24.000	1 12
LU70/MED	70 70	6.3 00 5.9 85	24.000 24.000	1 12









TUNGSTEN HAI	LOGEN LINE	VOLTAGE N	IEDIUM BAS	SE
TUBULAR LAM				
64484/CL 64484/FR	75 75	1.140	2.000 2.000	15



64484/CL	: 75	. 1 200	2.000	15
64484/FR	75	1.140	2.000	15
64486/CL	100	1 600	2.000	15
64486/FR	100	* 520	2.000	15
64488/CL	150	2,750	2.000	15
64488/FR	150	2.622	2.000	15



64488/CL 64488/FR	150 150	2.750 2.6 22	2.000 2.000	15	
TUNGSTEN HAL		VOLTAGE			_
Q100T3/CL Q150T3/CL	100 150	1 600 2 800	200 200	12	

3.600

6.000

11.000 33.000



HIGH PRESSUI	RE SODIUM	ED-231/2 MO	GUL BASE	LAMPS
_U50	50	4 000	24.000	1 12
1150/D	. 50	3.800	24.000	.5
LU70	70	6.300	24.000	! 12
20.00.0	סה ו	5.9 85	24.000	12
JU100	100	9.500	24.000	. 12
LU100/D	100	8.800	24.000	12
LU150/55	150	16.000	24.000	12
LU150/55/D	150	15.000	24.000	12

100

100

150

150

COLOR IMPROVED HIGH PRESSURE SODIUM LAMP

9.500

8.800

16.000

15.000

LU100/MED

LU150/MED LU150/D/MED

SHT50SDX

LU100/D/MED

24.000

24.000

24.000

24.000

12.000

12

12 12 12

12

0200T3/CL

0300T3/CL

Q500T3/CL

Q1500T3/CL

200

300

500

12

12

12 12

200

200

200

	Lighting		1	DAILY	MAH			BARE	COSTS		TOTAL	T
16	6 100 Lighting	CRE	W	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL GEP	
1600	90 watt	1 E	lec i	.30	26.670	С	5,140	645		5,785	6,600	1
1650	135 watt			.20	40		6,905	970		7.875	9.025	1
1700 I	180 watt			.20	40		7,308	970		8,278	9,475	1
1750	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2.047	2,325	1
1760	1500 watt		\neg	.20	40		3,427	970		4,397	5,200	1
1800	Incandescent, intenor, A21, 100 watt			1.60	5		173	120		293	370	1
1900	A21. 150 watt	T		1.60	5		211	120		331	410	1
2000	A23, 200 watt			1.60	5		227	120		347	430	
2200	PS 30, 300 watt			1.60	5		330	120		450	540	1
2210	PS 35. 500 watt			1.60	5		576	120		696	810	1
	PS 52, 1000 watt		1	1.30	6.150		1,525	150		1,675	1,900	1
2230	PS 52. 1500 watt			1.30	6.150		2.382	150		2,532	2,850	١
2240		+	-	1.30	6.150		375	150		525	630	1
2300				1.30	6.150		408	150		558	670	١
2400	R40, 150 watt		-	1.30	6.150		566	150		716	840	1
2500	Extenor, PAR 38, 75 watt		1	1.30	6.150		525	150		675	795	1
2600	PAR 38, 150 watt		-		7.270		1.928	175		2,103	2,375	1
2700	PAR 46, 200 watt			1.10	7.270		2,193	175		2,368	2.675	1
2800	PAR 56, 300 watt		-	1.10	8		375	195	-	570	695	1
3000	Guards, fluorescent tamp, 4' long			1	8.890		535	215		750	905	١
3200	8' long	+		.90	0.090	-	- 33	210		7.55		1
	RESIDENTIAL FIXTURES	1			400	-	48	9.70		57.70	67	1
0400	Fluorescent, interior, surface, circline, 32 watt & 40 watt	1 E	IOC	20	.400	Ea.	66	24		90	110	1
0500	2' x 2', two U 40 watt	1		8			45	12.15		57.15		1
700	Shallow under cabinet, two 20 watt	1		16	.500		41	19.40		60.40	74	┨
bo	Wall mounted, 41, one 40 watt, with baffle			10	.800		36	12.15		48.15	57	Ì
2000	Incandescent, extenor lantem, wall mounted, 60 watt	+		16	.500		_	49		153	185	1
2100	Post light, 150W, with 7' post			4	2		104	_		28.15		1
2500	Lamp holder, weatherproof with 150W PAR	+		16	.500	-	16	12.15		47.15		4
2550	With reflector and guard			12	.667		31	16.15	1	87.70		
2600	Interior pendent, globe with shade, 150 watt	نب		20	.400	1	78	9.70		87.70	100	4
0010	TRACK LIGHTING								D	60	79	
0080	Track, 1 crount, 4' section	1 6	iec	6.70	1.190	Ea.	33	29	-	85	105	+
0100	8' section			5.30	1.510		48	37		125	155	
0200	12' section	\bot	-	4.40	1.820	1	81	44			_	ᅥ
0300 I	3 circuits, 4' section	1	1	6.70	1.190		36	29		65	82	
0400	8' section	1_		5.30	1.510		48	37		85	105	\dashv
0500	12" SECUON	1		4.40	1.820		88	44	1	132	160	-
1000	Feed kit, surface mounting			16	.500		12	12.15	-	24.15	_	7
1100	End cover	1		24	.333		1.98	8.10	li .	10.08		D
1200	Feed kit, stem mounting, 1 circuit			16	.500		16	12.15		28.15		-
1300	3 circuit			16	.500		16	12.15	1	28.15		
2000	Electrical joiner for continuous runs, 1 circuit			32	.250		6.55			12.60		U
2100	3 circuit			32	.250		12.10			18.15		
2200	Fixtures, spottight, 150 PAR	1	L	16	.500		47	12.15	1	59.15		_
3000	Walt washer, 250 watt tungsten halogen			16	.500		101	12.15	il	113.15		
3100	Low voltage, 21/2 watt. 1 circuit			16	.500		102	12.15		114.15	_	_
3100	3 circuit	1		16	.500		109	12.15		121.15	140	

	Lighting			DAILY	MAN-			BARE (COST8	TOTAL
46	66 100 Lighting	CR	EW I	OUTPUT		UNIT	MAT.	LABOR	EQUIP. TOTAL	INCL DEP
100	175 watt metal halide	1 E	iec	8	1	Ea.	479	24	503	565
	250 watt metal halide			8	1		500	24	524	585
110	150 watt high pressure sodium	+		8	1		535	24	559	625
120		1		8	1		556	24	580	645
130	250 watt high pressure sodium	+	_	В			525	24	549	615
140	72 "H 18" sq., 400 watt metal halide			8	1		556	24	580	646
150	250 watt high pressure sodium	+		8	1		581	24	605	675
160	400 watt high pressure sodium	1 '	•		- '-	*	361			
190	Portable rectangle, 6" high 13.5" x 20"	 	7	-10	CET	Ea.	293	16.15	309.15	345
200	175 watt metal halide	''	ЮС	12	.667	EA .	314	16.15	330.15	
210	250 watt metal halide	+		12	.667		335	16.15	351.15	-
220	150 watt high pressure sodium			12	.667				376.15	
230	250 watt high pressure sodium	-		12	.667		360	16.15		
240	8" high 18" x 24", 400 watt metal halide			12	.667		365	16.15	381.15	
5250	250 watt high pressure sodium	1_		12	.667		376	16.15	392.15	
260	400 watt high pressure sodium			12	.667		398	16.15	414.15	
270	Portable square, 15" high 13.5" sq., 175 watt metal halide			12	.667		324	16.15	340.15	
5280	250 watt metal halide			12	.667		376	16.15	392.15	
5290 i	150 watt high pressure sodium			12	.667		360	16.15	376.15	-
5300	250 watt high pressure sodium			12	.667		386	16.15	402.15	
5400	Pendent 16" round/square, 175 watt metal halide			3.20	2.500		355	61	416	480
5410	250 watt metal halide	İ		2.70	2.960		370	72	442	515
5420	400 watt metal halide			2.40	3.330		398	81	479	555
430	150 watt high pressure sodium	T		3.20	2.500		398	61	459	525
40	250 with high pressure sodium		1	2.70	2.960		428	72	500	575
0	400 watt high pressure sodium	1		2.40	3.330		454	81	535	620
		1	•							
0010	LAMP8									
0080	Fluorescent, rapid start, cool white, 2' long, 20 watt	11	Elec	1	8	С	348	195	543	670
0100	4' long, 40 watt	1		.90	8.890		198	215	413	535
	3' long, 30 watt	1		.90	8.890		442	215	657	805
0120	U-40 watt	\top		.80	10		874	245	1,119	1,325
0150	4' long, 35 watt energy saver	1		.90	8.890		270	215	485	615
0170		+		.90	8.890		618	215	833	995
0200				80	10		577	245	822	990
0300		+		.80	10		603	245	848	1,025
0350		1		.90	8.890		750	215	965	1,150
0400		+	t	.80	10		775	245	1,020	1,200
0500				.90	8.890		1,285	215	1,500	1,725
0520	Very high output, 4' long, 110 watt	+	-	.70	11.430		1,285	275	1,560	1,825
	8' long, 215 watt						2,142	645	2,787	3.300
	Mercury vapor, mogui base, deluxe white, 100 watt		+	.30	26.670	_	1,663	645	2,308	2,775
0550 0600							1,003	645	3,613	4.225
0600	175 watt			.30	26.670	1 1	2.000	040	2,985	3,525
0600 0650				.30	26.670		2.968	CAE		
0600 0650 0700	175 watt			.30	26.670 26.670		2,340	645	1	
0600 0650 0700 0800	175 watt 250 watt 400 watt 1000 watt			.30 .30 .20	26.670 26.670 40		2,340 5.100	970	6.070	7,025
0600 0650 0700 0800 0900	175 watt 250 watt 400 watt			.30 .30 .20	26.670 26.670 40 26.670		2,340 5.100 3,749	970 6 45	6.070 4.394	7,025 5,075
0600 0650 0700 0800 0900	175 watt 250 watt 400 watt 1000 watt			.30 .30 .20 .30	26.670 26.670 40 26.670 26.670		2,340 5,100 3,749 4,712	970 645 645	6,070 4,394 5,357	7,025 5,075 6,125
0600 0700 0800 0900 11000	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt			.30 .30 .20 .30 .30	26.670 26.670 40 26.670 26.670		2,340 5,100 3,749 4,712 4,386	970 645 645 645	6.070 4.394 5.357 5,031	7,025 5,075 6,125 5,775
0600 0700 0800 0900 11000 11200	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt			.30 .30 .20 .30	26.670 26.670 40 26.670 26.670 26.670		2,340 5,100 3,749 4,712 4,386 9,894	970 645 645 645 970	6,070 4,394 5,357 5,031 10,864	7,025 5,075 6,125 5,775 12,300
0600 0700 0800 0900 1000 1100 1300	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt			.30 .30 .20 .30 .30	26.670 26.670 40 26.670 26.670 26.670 40		2,340 5,100 3,749 4,712 4,386 9,894 9,960	970 645 645 645 970 970	6.070 4.394 5.357 5.031 10.864 10.930	7,025 5,075 6,125 5,775 12,300 12,400
0600 0650 0700 0800 0900 1100 11200 1300	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens			.30 .30 .20 .30 .30 .30	26.670 26.670 40 26.670 26.670 40 40 40		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268	970 645 645 645 970 970 970	6,070 4,394 5,357 5,031 10,864 10,930 10,238	7,025 5,075 6,125 5,775 12,300 12,400 11,600
0600 0700 0800 0900 11000 11200 1320 1320	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1500 watt			.30 .30 .20 .30 .30 .30 .20	26.670 26.670 40 26.670 26.670 26.670 40		2,340 5,100 3,749 4,712 4,386 9,894 9,960	970 645 645 645 970 970	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125
0600 0650 0700 0800 0900 1100 1200 1300 1320 330	175 watt 250 watt 400 watt 1000 watt Metal haide, mogul bass, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1000 watt 1500 watt Sodium high pressure, 70 watt			.30 .30 .20 .30 .30 .30 .20 .20	26.670 26.670 40 26.670 26.670 40 40 40		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268	970 645 645 645 970 970 970	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125 6,300
0600 0700 0800 0900 11000 11200 1320 330 50 1360	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1000 watt 1500 watt Sodium high pressure, 70 watt			.30 .30 .20 .30 .30 .30 .20 .20	26.670 26.670 40 26.670 26.670 40 40 40 26.670		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268	970 645 645 645 970 970 970	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125 6,300 6,525
0600 0650 0700 0800 0900 11000 1200 1320 50 1360 1370	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1000 watt. 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt			.30 .30 .20 .30 .30 .30 .20 .20 .20 .30	26.670 26.670 40 26.670 26.670 40 40 40 26.670 26.670		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871	970 645 645 970 970 970 970 645 645	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025	7,025 5.075 6.125 5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875
0600 0650 0700 0800 0900 11000 11200 1320 1320 50 1370 1370 1370	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1000 watt 1500 watt Sodium high pressure, 70 watt 150 watt 150 watt 250 watt			.30 .30 .20 .30 .30 .30 .20 .20 .20 .30 .30	26.670 26.670 26.670 26.670 26.670 40 40 26.670 26.670 26.670 26.670		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,069	970 645 645 645 970 970 970 645 645	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250
0600 0650 0700 0800 0900 11000 11200 1320 50 1380 1380 1400	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt. 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt 150 watt 250 watt 400 watt			.30 .30 .20 .30 .30 .30 .20 .20 .20 .30 .30 .30	26.670 26.670 40 26.670 26.670 40 40 26.670 26.670 26.670 26.670 26.670		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,069 5,380	970 645 645 970 970 970 645 645 645	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372 14,322	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250 16,100
0600 0650 0700 0800 0900 11000 1200 1300 1320 50 1360 1370 1380	175 watt 250 watt 400 watt 1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt 1000 watt 1500 watt Sodium high pressure, 70 watt 150 watt 150 watt 250 watt			.30 .30 .20 .30 .30 .30 .20 .20 .20 .30 .30 .30 .30	26.670 26.670 26.670 26.670 26.670 40 40 26.670 26.670 26.670 26.670 26.670		2,340 5,100 3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,069 5,380 5,727	970 645 645 645 970 970 970 645 645 645 645	6,070 4,394 5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372	7,025 5,075 6,125 5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250

Distribution:

(718) Project No. 290 0379 000
(710)
Local LD. 851577 Placed Rec'd Date 6-7-90
T. Todd. Conversed With Mr. Singer Of American Scientific Lighting Co. Regarding HPS retrotits
Of American Schutific Labority Co. Regarding HTS regrotity
For retrofits of incandescent fixtures, the "Bulb Lumenight"
and "Colorlight" products are recommended. The lamps one
riplaceable in both and the "colorlight" is more whitish.
Chitractors costs linculains lamb of for quantities of 100+
and "Colorlight" products are recommended. The lamps are replaceable in both and the "colorlight" is more whitish. Unitractors costs (including lamp) for quantities of 100+ are as follows:
Bulh lumburalit 35W - \$45 / 10mps only
Bulb Lumenight 35 W - \$45 (lamps only) 50 W - \$45 (\$76-\$20) (also come in 70 W, 100 W 150 W) Colorlight 50 W - \$67 (lamps only)
(also come is 70 W 1000 W 150 W)
, is a first transfer of the second transfer
Colorlight 50W - \$67 (lamps only
Colorlight 50W - \$67 (lamps only \$30)
the sill confi a come of their cotalna for dimension
They will send a copy of their contains for dimensions.



DOWNLITETM CONVERSION SERIES: COMPACT FLUORESCENT REFLECTOR LAMPS

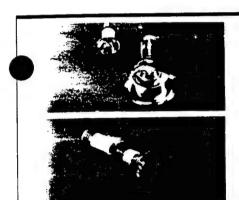


GLOBE FLECTOR™ LUMA FLECTOR™

- LAMP: Compact disposable fluorescent globe or tubular iamp/Standard or tapered base
- REFLECTOR: Highly polished aluminum
- · WATTAGE: Fifteen
- · LUMENS: 1350
- COLOR: Warm wnite/2800k
- USE: Indoor only
- . BURNING POSITION: Any
- . LAMP LIFE: 9,000 hours
- INSTALLATION: Screws into any 120V medium base socket
- . PACKAGING: Ten conversions per carton

CATALOG NUMBER	LAMP	DIMENSIONS
DGF S/15	BFG15 LE/A	Reflector Diameter 51/4" Overall Length 61/4"
DGF T/15	BFG15 LE/T	Reflector Diameter 51/4" Overall Length 63/4"
DLF S/15	BFT15 LE/A	Reflector Diameter 51/6" Overall Length 63/6"
DLF T/15	BFT15 LE/T	Reflector Diameter 51/2" Overall Length 7"

LINE VOLTAGE/LOW VOLTAGE MR16 HALOGEN CONVERSIONS



HALOGENLITE™ 120V

- LAMP: MR16 Dichro-Cool tungsten haloger/Medium base or intermediate with medium adapter base and clip on lens/Line voltage/Cool crisp white light 3000k/Dimmable up to twenty five percent/Medium beam spread.
- LAMP LIFE: 2,000 hours/High lumen maintenance
- INSTALLATION: Screws directly into any ventilated 120V medium base porcellin socket rated above 100 watt/Minimum front diameter opening 434"
- · PACKAGING: Ten lamps per carton

HALOGENLITE"12V

- ADAPTER: Molded Valox^a plastic/Vented to cool internal components
- · FINISH: Black
- LAMP:MR16 Dichro-Cool tungsten halogen/Low /oitage/Stepdown transformer/Dimmable/Cool crisp white light 3000k/Natural sunlight appearance
- LIFE: 2000 hours 20 watt/3000 hours 50 watt
- INSTALLATION: DH 12/20 screws into any medium base porcein socket rated for 75 watts/DH 12/50 into socket rated for 150 watts
- PACKAGING: Four conversions per carton/Lamp ncluded

CATALOG NUMBER	LAMP	DIMENSIONS
MEDIUM		
DH 120 M/75	JDR75	Lamp Diameter 2"
DH 120 M/100	JDR100	Overall Length 2 5/16"
INTERMEDIATI	E	
DH 120 I/75	JDR75	Lens Diameter 21/s"
DH 120 I/100	JDR100	Overall Length 5%"
OPTIONS: R Reflector N Narrow Bear	n Spread 10°	M Medium Beam Spread 18* W Wide Beam Spread 28*

LAMP	DIMENSIONS
JR/20 JR50	Adapter Diameter 31/4" Overall Length 6"
	Adapter Diameter 31/4" Overall Length 73/4" Lens Diameter 5"
	JR/20

 OPTIONS:
 EXT
 Narrow Spot/50w

 BAB
 Flood/20w
 EXZ
 Narrow Flood/50w

 ESX
 Narrow Spot/20w
 EXN
 Flood/50w

COLOR IMPROVED HPS HIGH HAT CONVERSION



COLORLITE 50™

- ADAPTER: Heavy gauge spun aluminum
- FINISH: Caustic etcning
- REFLECTOR: Highly polished aluminum/Vented slots for cool operation
- LAMP COLOR: 2500K LAMP LIFE: 12000 Hours
- INSTALLATION: Adapter screws into a standard 120V high hat fixture/Medium base porcelain socket required/ Fixture rated for a minimum of 150 watts/Minimum front plameter opening 5"
- · PACKAGING: Four conversions per carton/Lamp included

AMERICAN SCIENTIFIC LIGHTING CORPORATION · BROOKLYN. NEW YORK ·

TEL. (800) 552-3465

(718) 851-4577

LAMP

CATALOG

DC/50

FAX (718) 853-2390

Reflector Diameter 51/4"

Overall Height 81/2"

DIMENSIONS

NHT50 SDX Adapter Diameter 31/8"

ECO Number: GP-N-2

REPLACE INCANDESCENTS WITH CIRCLINE FLUORESCENTS

Discussion

Many buildings at RAAP are lit with inefficient incandescent lighting. This ECO analyzes the replacement of interior incandescent lamps with 32 W circline fluorescent screw-in retrofit fixtures. This type of project is suitable for nonexplosion-proof interior fixtures. Replacing 100 W incandescents with 32 W circlines would increase the lumen output by five percent, from 1,750 lumens to 1,830 lumens. Replacing 150 W incandescents with 32 W circlines would decrease the lumen output 57 percent, from 2,880 lumens to 1,830 lumens.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that incandescent lamps be replaced with fluorescent circline fixtures.

Construction Cost = \$13,048

Annual Energy = 371 MBtu/yr

Savings (electricity)

Annual Cost Savings = \$6,416/yr

SIR = 4.38

Simple Payback = 2.0 years

PRO FIS	ENERGY STALLATION & I DJECT NO. & T SCAL YEAR 1990	CONSERVATION LOCATION: RAN ITLE: GP-N-2 O DISCRET	N INVESTMENT DFORD AAP REPLACE IN E PORTION NAM	CAND. W/ CIRCLI	LCCID NOS. 3 CENSI NE FLUOR.	1.035 US: 3
1.	E. SALVAGE	OST REDIT CALC (·		\$ \$ \$ -\$	13048. 718. 783. 13094. 0. 13094.
2.	ENERGY SAVII ANALYSIS DA	NGS (+) / COS TE ANNUAL SA	ST (-) VINGS, UNIT C	OST & DISCOUNTE	D SAVINGS	
	FUEL			ANNUAL \$ SAVINGS(3)		
	A. ELECT B. DIST C. RESID D. NAT G E. COAL	\$ 8.87 \$.00 \$.00 \$.00 \$.00	371. 0. 0. 0. 0.	\$ 0. \$ 0.	8.78 12.34 12.05 12.48 10.01	28845. 0. 0. 0.
	F. TOTAL		371.	\$ 3285.		\$ 28845.
3.	NON ENERGY S	SAVINGS(+) /	COST(-)			
	(1) DISC	RECURRING (+, COUNT FACTOR COUNTED SAVIN		3A1)	9.11	
				GS(+) /COST(-)	(3A2+3Bd4) \$	28523.
	(1) 25% A 1 B 1 C 1	MAX NON ENER IF 3D1 IS = 0 IF 3D1 IS < 3 IF 3D1B IS =	> 1 GO TO I	X .33) O ITEM 4 R = (2F5+3D1)/1	\$ 9519. F)= 2.93	
4.	FIRST YEAR D	OOLLAR SAVING	SS 2F3+3A+(3B	1D/(YEARS ECONOR	MIC LIFE)) \$	6416.
5.	TOTAL NET DI	SCOUNTED SAV	/INGS (2F5+3C)	\$	57368.
6.	DISCOUNTED S) 「QUALIFY)	(SIR)=(5 / 1	F)= 4.38	
	(11 < 1 PROC	DECT DOES NOT	quite 111			

EYNOLDS. SMITH AND HILLS RCHITECTS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER T. TOULD	DATE DATE	0379 060 of
GP-N-2 PEPLACE	INCANDESCENTS WITH	CIRCLINE FLUORES	CENTS
Calculations were made			1
circline fluorescent for	Huras in place of in	cendescents for	
interior non-explosion	V 0		
(alculations ere on			
a list of the buildings	<u> </u>		
was compiled (page			
10% of the interior			
be retrofolled in the	0.1 × 1536 = 15		considered
Energy Sovings = 7	0.5 Rush x 0.003413 ME	tu 154 = 371 1	MBtu/gr
Energy cost savings	0.5 <u>harl</u> x 0.003413 ME gv kurt = \$21.34 x 154 fixture yr-fixture	= \$3286 Jur	٠٥
Matl & labor cost so	w-historie	4 = \$3131 /yr	
Total cost saving	s = 3286 + 3131 =	\$ 6417 /yr	
Project cost = \$ 9.	5 = 3286 + 3131 = 1.47 _ 15+ = 14,54	t-8	-
(Construction (ost= 14,548/1.115=	\$13,048)	
	\$14,548 = 2.3 yr		

		Lighting 7		A	0379 000
REYNOLDS. SMITH AND HILLS	Screen T.	Thodalcs		SHEET	OF
ARCHITECTS • ENGINEERS • PLANNERS INCORPORATED	CHECKER	HOUN		DATE	
				and the second s	
GP-N-2 Replace interior					
fllorescent fix	tures for	non-expl	osion pr	not apple	cations
		0		1 00	
- Assume orginal lie	ht levels	should no	t be redu	uced strant	icantly.
	/		1	Ψ	
(32 W fluor. pm	prides luma	n output b	etween !	100W and	150W incend,
	. ,	U		:	
Energy savings = (1	5011/- 274	241	21.0 00	705	twh
energy saverage - (JU VV - J4 W		y zer ougs	= 10)	410
		day	7		1
Energy cost savings = 7	25 kw/	£0.03.076	- \$21	.34	
Entran (ost mounts - 1	44	kuh	- 4	~	
		- C- C)	
Labor & mat'l cost so	vivas = / I	neard cost	Fluor, c	ost \ 62	40 hr
	1 1 1	750 hr	12000		gr
				1	٥
= (+2.11 matil + 1	1.20 lator x 0.	683) _(15.5	55×14 mat'l	+ \$2,45 labor	(x a 483)
750	Ar	!	12,0	000 hr	_ <u> </u>
		·	6240 h	C = \$	20.33
	<u>i</u>		y		gr
				, 7	
Total cost savings =	\$21.34	120.33	= \$41.0	et	
<u> </u>	yr	gr	_ yr		1 1 1 1
11 110	10 C- 1		· M.H. /	1001.	1 - 0 16 +
Math cost = \$42.5	o for tixtur	e x 1.10 (cuttation (1504 Cul	lor xiterallin
	\$ 5.55 for la	1.10 (n+1, =	755,50	
10- + 1100	v 1 70 × 0	683 /10	et of letter	ina ina	1 bulb + 202
_ Labor cost = \$1.20	x 1.20 x 0		51 01 199100	- Contract of the	2000
Project last	(1.045×\$5.	330 +/1.7	2 x \$ 0.9	8 1 x 1.661	= + 94,47
Tiglet cosc 1			1013	J. KEL	
Simple publich =:	\$ 94.47	_ 2.3	4r < 10	wr.	
Simple payback =	\$ 41.67 /nr		0	0	
	11/0	:			

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Open Tank Air Dry Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
2019 -00	Boiling Tub House	NC. B-Line	3	50	150
2022 -00	Reater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3	30	90
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	50	150
4912 -40	Forced Air Ory House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
	MK 43 Sawing and Inhibiting			4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	1	7	7
	Inspect/Clean NG Tanks *		1	21	21
4951 -02	TOW Launch Saw House	Pilot B	1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	ist R P	1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1	130	130
	Rolled Powder Building		2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST ESTIMATE)	SHEET	4 or 11	
ROJECT ENERGY ENGINEERING	ANALYS	IS				OR ESTIMATE		
RADFORD ARMY AMMUN	ITION F	LANT			CODE A (No design completed) CODE & (Preliminary design) CODE C (Final design) OTHER (Specify)			
ARCHITECT ENGINEER			5 7	\ \ \				
REYNOLDS, SMITH AND) HILLS	A.E.	P., II	7C.		CHECKED BY		
DRAWING NG. P-N-Z			<u>T.</u>	Tood				
Incaud. to fluor. SUMMARY	NO.	UNIT	PER	TOTAL	PER	TOTAL	TOTAL	
	UNITS	MEAS	UNIT		UNIT			
Replace incordescent	154	tixt.	0.98	151	53.30	8208	8359	
Talips with 32W fluor.								
circline screw-ins								
Sales tax	4.5%					369	369	
FICA I Insurance	20.0%			30		303	30	
Subtotal	20.01,			181		8577	8758	
Overhead	15.01.			101			1314	
Profit	10.07						1007	
Performance Bond	1.0%						111	
Herriles Support	6.0%						671	
Contingency	10.0%						1186	
Construction Cost							13047	

GP-N-2 p.5 of 11

SCP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013-TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

* WAITS	LINE WATTS	TOTAL LUMEN CUTPUT	LUMENS PER WATT	HOURS OF RATED LIFE	*
	Y VAPOR (DELUX		50	24000	*
* 1000	1075	63000 23000	59 56	24000 24000	*
* 400	450	13000	42	24000	*
* 250	290 205	8500	49	24000	*
* 175 * 100	120	4500	42	24000	*
* 75	93	3150	37	16000	*
× 50	61	1680	31	16000	*
****** METAL	HALTDE				*
* 1500	1600	155000	103	3000	*
* 1000	1100	110000	100	12000	*
* 400	460	34000	85	15000	*
* 175	210	14000	85	7500	*
****** HIGH F	RESSURE SODIUM				*
* 1000	1080	140000	130	24000	*
* 400	480	50000	104	24000	<u> </u>
* 250	310	27500	89	24000	
* 150	200	16000	80	24000	*
100	135	9500		24000 24000	· ·
70	85 70	5800 4000	57	24000	*
* 50 * 35	42	2850	67	18000	*
********FLUORES					*
	48	3150	66	20000+	* · · · * · · · * · · · · · · · · · · ·
STRAIGHT 40		(1830)	50	12000+	*
CIRCLINE 32 CIRCLINE 22	25	1050	42	12000+	*
CIRCLINE 20	23 —	850	37	12000+	*
TWIN TUBE 13	16	900	56	10000+	*
TWIN TUBE 9	12	600	50	10000+	*
STRAIGHT 8	11	400	36	7500+	*
TWIN TUBE 7	10	400	40	10000+	*
STRAIGHT 6	9	300	33	7500+	*
TWIN TUBE 5	8	250	31	10000+	x
	DESCENT				*
* 1000	1000	23740	24	1000	π
* 750	750	17040	23	1000	· *
* 500	500	10850	22	1000	<u>.</u> .
200	200	3710	19	750	*
* (150)	150	(2880)	19	750	*
* 100 * 75	100 75	(1750) 1190	18 16	750 750	
					*
* 1500	S—IODINF. 15J0	35800	24	3000	*
* 1000	1000	23400	23	2000	*
* 500	500	10950	2 2	2600	<u> </u>
* 250	250	4850	19	2000	×

				DAILY	MAN-			BARE			TOTAL	
16	6 100 Lighting	CI	REW	ООТРИТ	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OAP)
600 I	90 watt	1	Elec	.30	26.670	C	5,140	645		5,785	6,600	Ī
1650	135 watt			.20	40		6,905	970		7,875	9,025	
700	180 watt		T	.20	40		7,308	970		8,278	9,475	
750	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2.047	2,325	
1760	1500 watt			.20	40		3,427	970		4,397	5,200	
1800	Incandescent, interior, A21, 100 watt			1.60	5		173	120		293	370	
	A21. 150 watt		\top	1.60	5		(211)	120		331	410	Ī
1900	A23, 200 watt			1.60	5		227	120		347	430	
2000			+	1.60	5		330	120		450	540	-
2200	PS 30, 300 watt			1.60	5		576	120		696	810	
2210	PS 35, 500 watt) 	╁				1,525	150		1,675	1,900	-
2230	PS 52, 1000 watt			1.30	6.150					2,532	2,850	
2240	PS 52, 1500 watt			1.30	6.150		2,382	150			630	-
2300	R30, 75 watt			1.30	6.150		375	150		525	670	
2400	R40, 150 watt		4_	1.30	6.150		406	150		558		_
2500	Exterior, PAR 38, 75 watt			1.30	6.150		566	150		716	840	
2600	PAR 38, 150 watt	/		1.30	6.150	$\sqcup \bot$	525	150		675	795	_
2700	PAR 46, 200 watt			1.10	7.270		1,928	175		2,103	2,375	
2800	PAR 56, 300 watt			1.10	7.270		2,193	175		2,368	2,675	_
3000	Guards, fluorescent tamp, 4' long	ı		1	8		375	195		570	695	
3200	8' long		Į.	.90	8.890		535	215		750	905	_
	RESIDENTIAL FIXTURES											
0400	Fluorescent, interior, surface, circline, 32 watt & 40 watt	1	Elec	20	.400	Ea.	48	9.70		57.70	67	_
0500	2' x 2', two U 40 watt			8	1		66	24		90	110	
0700	Shallow under cabinet, two 20 watt			16	.500		45	12.15		57.15	67	
0900	Wall mounted, 41, one 40 watt, with baffle			10	.800		41	19.40		60.40	74	
	Incandescent, exterior lantem, wall mounted, 60 watt			16	.500		36	12.15		48.15	57	•
2000	Post light, 150W, with 7' post		_	4	2		104	49		153	185	_
2100	Lamp holder, weatherproof with 150W PAR			16	.500		16	12.15		28.15	35	
2500			+	12	.667		31	16.15		47.15		•
2550	With reflector and guard			20	400		78	9.70		87.70		
2600	Interior pendent, globe with shade, 150 watt			20	.400	-	10	3.70				-
	TRACK LIGHTING	s .	F1	6.70		-	33	29		62	79	
0080		<u> </u>	Elec	+	1.190	Ea.	48	37		85	105	-
0100	8' section			5.30	1.510			44	-	125	155	
0200	12' section	<u> </u>	+	4.40	1.820	1	81				82	-
0300	3 circuits, 4' section	_		6.70	1.190		36	29	1	65	105	
0400	8' section	2	_	5.30	1.510	\vdash	48	37		85		-
0500	12' section Feed kit, surface mounting	24:1		4.40	1.820	1	88	44		132	160	
1000	Feed kit, surface mounting	3		16	.500		12	12.15		24.15	_	-
1100	End cover			24	.333	1	1.98	8.10	1	10.08		
1200	Feed kit, stern mounting, 1 circuit			16	.500		16	12.15		28.15		_
1300	3 circuit			16	.500		16	12.15		28.15		
2000	Electrical joiner for continuous runs, 1 circuit			32	.250		6.55	6.05	i	12.60	_	-
2100	3 circuit			32	.250		12.10	6.05	5	18.15		
	Fixtures, spotlight, 150 PAR	ے ا		16	.500		47	12.15	i	59.15	70	
2200	Wall washer, 250 watt tungsten halogen			16	.500		101	12.15		113.15	130	
3000	Low voltage, 25 watt in gater hangest	1		16	.500		102	12.15	1	114.15	130	
3100	LOW VOILEGE, / Watt. 1 Circuit	-	+	16	.500	1	109	12.15		121.15		٠

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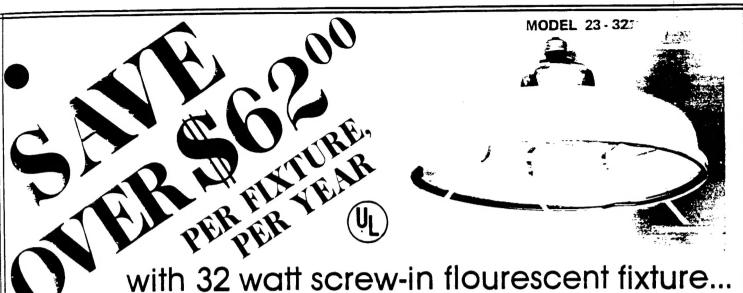
	Lighting		DAILY	MAN-			BARE			TOTAL	
16	6 100 Lighting	CREW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL DAP	L
100	175 watt metal halide	1 Ele	8	1	Ea.	479	24		503	565	1
110	250 watt metal halide		8	1		500	24		524	585	1
_	150 watt high pressure sodium	\top	8	1		535	24		559	625	ı
120	250 watt high pressure sodium		8	1		556	24		580	645	1
130	72 "H 18" sq., 400 watt metal halide	1	8	1		525	24		549	615	ı
140	250 watt high pressure sodium		8	1		556	24		580	645	
150		++	8	1		581	24		605	675	1
160	400 watt high pressure sodium	'	"	'	'						۱
190	Portable rectangle, 6" high 13.5" x 20"	1 Ele	12	.667	Ea.	293	16.15		309.15	346	1
200	175 watt metal halide	1 200	12	.667	Ī	314	16.15		330,15	370	ı
210	250 watt metal halide	+-	12	.667		335	16.15		351.15	390	1
220	150 watt high pressure sodium					360	16.15		376.15	420	1
230	250 watt high pressure sodium	+	12	.667	-	365	16.15		381.15	425	1
240	8" high 18" x 24", 400 watt metal halide		12	.667		376	16.15		392.15	435	ı
250	250 watt high pressure sodium	+	12	.667					414.15	460	t
260	400 watt high pressure sodium		12	.667		398	16.15		340.15	380	ı
270	Portable square, 15" high 13.5" sq., 175 watt metal halide	+	12	.667	-	324	16.15				ł
280	250 watt metal halide		12	.667		376	16.15		392.15 276.15	435	1
290	150 watt high pressure sodium	\bot	12	.667	-	360	16.15		376.15	420	1
300	250 watt high pressure sodium		12	.667		386	16.15		402.15	450 480	١
5400	Pendent 16" round/square, 175 watt metal halide	\bot	3.20	2.500	\vdash	355	61		416		4
5410	250 watt metal halide		2.70	2.960		370	72		442	515	١
5420	400 watt metal halide		2.40	3.330	\sqcup	398	81		479	555	4
5430	150 watt high pressure sodium		3.20	2.500		398	61		459	525	١
5440	250 watt high pressure sodium		2.70	2.960		428	72		500	575	4
150	400 watt high pressure sodium		2.40	3.330		454	81	İ	535	620	ı
											1
0010	LAMP8										1
0080	Fluorescent, rapid start, cool white, 2' long, 20 watt	1 Ek	c 1	8	C	348	195		543	670	4
0100	4' long, 40 watt		.90	8.890		198	215		413	535	١
	3' long, 30 watt		.90	8.890		442	215		657	805	4
0120	U-40 watt		.80	10		874	245		1,119	1,325	١
0150	4' long, 35 watt energy saver		.90	8.890		270	215		485	615	
0170	Slimline, 4' long, 40 watt		.90	8.890		618	215		833	995	1
0200	3' long, 75 watt		.80	10		577	245		822	990	
0300	8' long, 60 watt energy saver	\dashv	.80	10		603	245		848	1,025	
0350			.90	8.890		750	215		965	1,150	
0400	High output, 4' long, 60 watt	-	.80	10		775	245		1,020	1,200	
0500	8' long, 110 watt		.90	8.890		1,285	215		1,500	1,725	
0520	Very high output, 4' long, 110 watt	\dashv	.70	11.430	_	1,285	275		1,560	1,825	
0550	8' long, 215 watt			26.67		2,142	645		2.787	3,300	
0600	Mercury vapor, mogul base, deluxe white, 100 watt	++	.30	26.67	_	1,663	645		2,308	2,775	٦
0650	175 watt		.30			2,968	645		3,613	4,225	
0700	250 watt	\dashv	.30	26.67	_	_	645		2,985	3,525	
0800	400 watt		.30	26.67	٧	2,340	1		6,070	7,025	
0900	1000 watt	_	.20	40	-	5,100	970	+	4,394	5,075	-
1000	Metal halide, moguli base, 175 watt		.30	26.67		3,749	645	_	5,357	6,125	
1100	250 watt		.30	26.67		4,712	645	+	5,031	5,775	4
1200	400 watt		.30	26.67	0	4,386	645	-	1	12,300	
1300	1000 watt		.20	40	\bot	9.894	970		10.864	12,400	_
1320	1000 watt, 125,000 initial lumens		.20	40	1	9,960	970		10,930		
1330	1500 watt		.20	40	\bot	9.268	970	-	10.238	11,600	_
350	Sodium high pressure, 70 watt		.30	26.67	0	4,712	645		5,357	6,125	
1360	100 watt		.30	26.67	0	4.871	645	-	5,516	6,300	_
	150 watt		.30	26.67	0	5,059	645		5,704	6,525	
1370	250 watt		.30		0	5,380	645		6,025	6,875	_
1380			.30	_		5,727	645		6.372	7,250	
1400	400 watt		.20			13,352	970		14,322	16,100	_
1450	1000 watt Low pressure, 35 watt	\dashv	.30		0	3,963	645		4,608	5,300	
1500	I was a second The MART		J .JU	الا، يت		, ,,,,,,,	1		5,031	5,775	

GP-N-3 +364

ECP ENERGY CONSERVATION PRODUCTS EFFECTIVE 3/511 CANAL STREET NEW YORK, N.Y. 10013 (212)925-5991

EFFECTIVE 3/1/84

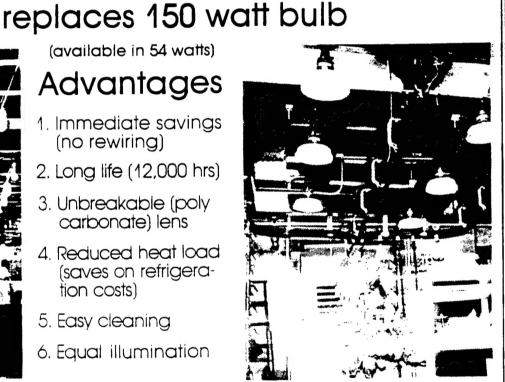
	MAIN MICES				
ORDERING CODE	TYPE	WATTAGE	LIST	CONT.	MIN QTY
F4T5/CW F4T5/WW	FLUORESCENT FLUORESCENT	14 14	6.37 7.17	3.19 3.59	12 12
F6T5/CW F6T5/WW	FLUORESCENT FLUORESCENT	6 6	6.37 8.79	3.20 4.40	12 12
F8T5/CW F8T5/WW	FLUORESCENT FLUORESCENT	8 8	6.03 7.15	3.02 3.58	12 12
FC6T9/CW FC6T9/WW	FLUORESCENT FLUORESCENT	20 20	10.00 11.35	5.00 5.68	12 12
FC8T9/CW FC8T9/WW	FLUORESCENT FLUORESCENT	22 22	10.00	5.00 5.68	12 12
FC12T9/CW FC12T9/WW	FLUORESCENT FLUORESCENT	32 32	11.10 12.50	5.55 6.25	12 12
FC16T9/CW FC16T9/WW	FLUORESCENT FLUORESCENT	40 40	13.00 14.75	6.50 7.38	12 12
PL-7 PL-9 PL-13	FLUORESCENT FLUORESCENT FLUORESCENT	7 9 13	13.00 13.00 14.00	6.50 6.50 7.00	10 10 10
LU-35 LU-50 LU-70 LU-100 LU-150	H.P.S. H.P.S. H.P.S. H.P.S.	35 50 70 100 150	70.00 70.00 70.00 80.00 80.00	35.00 35.00 35.00 40.00	6 6 6 6
ESX (NARROW) EAB (WIDE)	QUARTZ HALOGEN QUARTZ HALOGEN	20 20	20.00	10.00	14
EXT (NARROW) EXN (WIDE)	QUARTZ HALOGEN QUARTZ HALOGEN	50 50	21.00 21.00	10.50	14 14
EYF (NARROW) EYC (WIDE)	QUARTZ HALOGEN QUARTZ HALOGEN	75 75	22.00 22.00	11.00	<u>4</u>



(available in 54 watts)

Advantages

- 1. Immediate savings (no rewiring)
- 2. Long life (12,000 hrs)
- 3. Unbreakable (poly carbonate) lens
- 4. Reduced heat load (saves on refrigeration costs)
- 5. Easy cleaning
- 6. Equal illumination



After

nciua.ng Bailasti

COMPARE COSTS* **Before**

150 watt RS/TF incandescent bulb vs. 32 watt flourescent screw-in

\$46.80 **Energy Cost** Lamp & maintenance cost

\$21.31

VS

VS

\$ 1.82

\$11.54

\$19.49

By reducing the heat load caused by the incandescent bulb, you can achieve additional savings on refrigeration costs

Total Savings

\$62.90

\$10.85

savings

\$32.56

raksed on 12 hour burn 5 d**a**vs ber veek

DISTRIBUTED BY:



TWIST OF THE WRIST® BRAND ENERGY SAVING LIGHTING FIXTURES

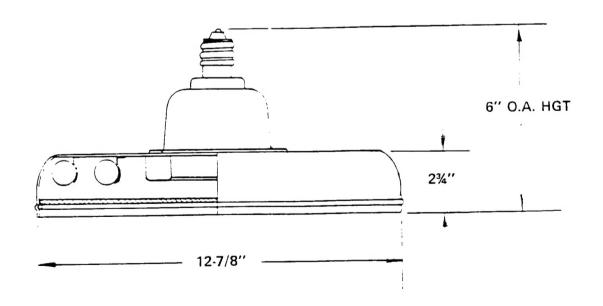
MODEL 23 32 WATT OR 54 WATT

SOCKET: Standard Medium Base HOUSING: Aluminum DIFFUSER: Clear Polycarbonate

BALLAST: Robertson R32AP-WS (32 watt)

Robertson R2232P-WS (54 watt)

MODEL =	LAMP	WATTAGE	TEMPERATURE RANGE
23-32 23-54	FC12T10 FC12T10 FC8T9	32 32 22	Down to 32°F Down to 32°F
23-32-0′ 23-54-0′	FC12T10 FC12T10	32 32	Down to 0 ° F Down to 0 ° F





GRNZ pillof 1

ECP ENERGY CONSERVATION PRODUCTS
511 CANAL STREET NEW YORK, N.Y. 10013 (212)925-5991

EFFECTIVE 3/1/84

	PRICING - MODEL # 23 SCREW-IN FLUORES	SCENT CON	VERSIONS	
FIXTURE PRICES	DO NOT INCLUDE LAMPS.			
MODEL	DESCRIPTION	LIST	CONT.	MIN QTY
23 - 32 =====	32 WATT SCREW IN FLUORESCENT FIXTURE (WHITE FINISH) WITH LEXAN DIFFUSER.	85.80	42.90	3
23-54 =====	54 WATT SCREW IN FLUORESCENT FIXTURE (WHITE FINISH) WITH LEXAN DIFFUSER.	99.30	49.65	3
	OPTIONS			
DIFFUSER	N - WITHOUT LEXAN DIFFUSER DEDUCT	9.90	4.95	-
BALLAST	V - 277 VOLT BALLAST	12.00	6.00	
STANDARD MODEL	O - ZERO DEGREE HALLAST(DOWN TO O F) 32WATT 54WATT BALLAST WILL LIGHT DOWN TO 32 F. ORDERS	16.00	8.00 8.00 8.00	- - D 10%
FIXTURE PRICES	PRICING - MODEL #25 RECESSED CEILING F	IXTURE RE	ETRO-FIT	
MODEL	DESCRIPTION	LICE	CONT	MIN QTY
25-20-DW	20 WATT RECESSED FLUORESCENT CONVERSION FIXTURE WITH SCREW IN ADAPTOR AND WHITE ACRYLIC DIFFUSER (WHITE FINISH)		45.90	
25-22-DW	22 WATT - SAME AS ABOVE	104.00	52.00	100
	OPTIONS		,2	
DIFFUSER	PQ - PARASQUARE PA - PARAHEX	13.40 14.90	6.70 7.45	-
BODY TYPE	A - ADJUSTABLE STEM	CC	NSULT FA	CTORY

BALLAST C - COLD WEATHER BALLAST 14.00 7.00